DOES NOT CIRCULATE

PUBLISHED WEEKLY

PRICE TWO SHILLINGS AND SIXPENCE

UNIVERSITY OF MICHIGAN
FEB 28 1955
MEDICAL LIBRARY

THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—42ND YEAR SYDNEY, SATURDAY, JANUARY 22, 1955 No. 4

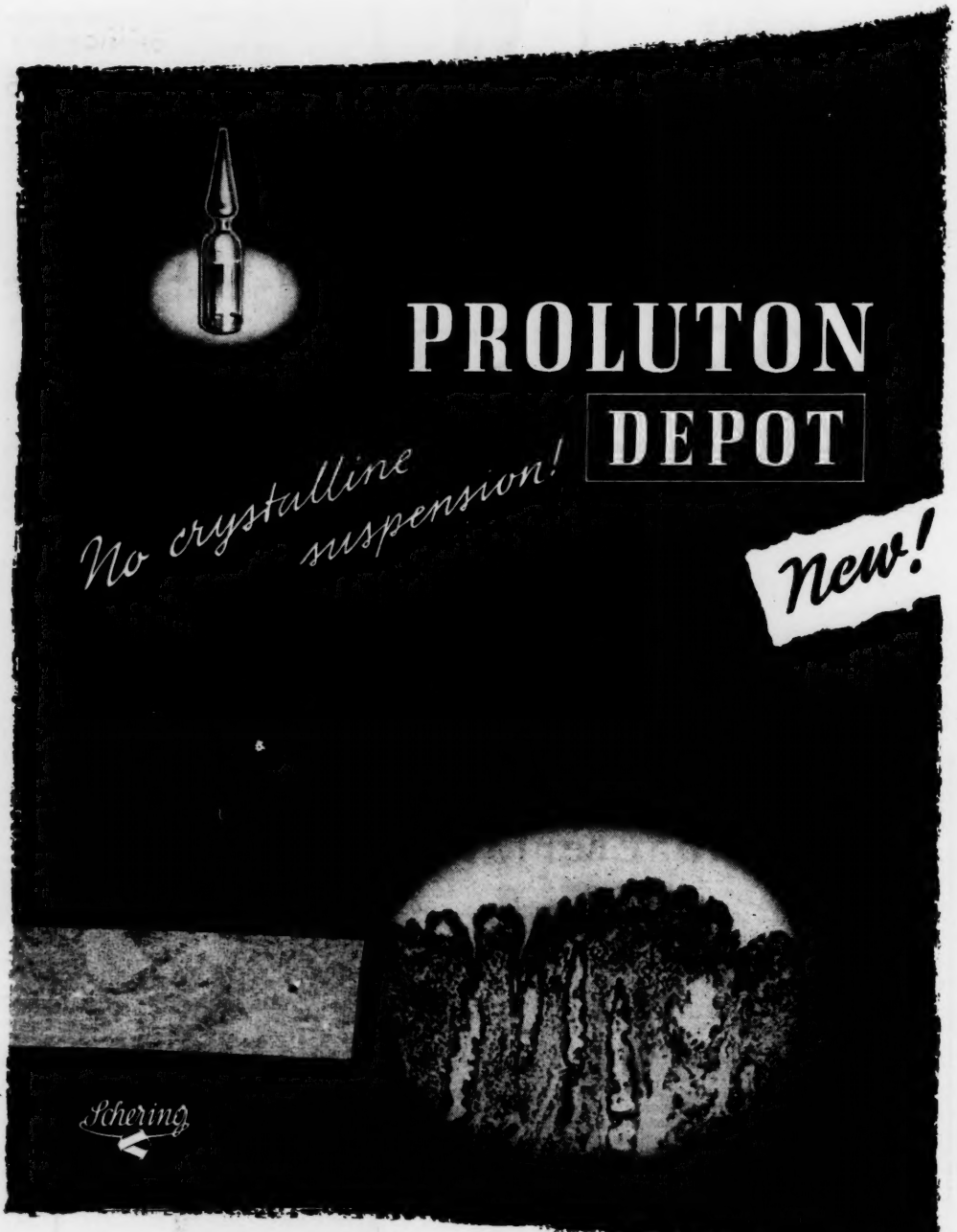
*Now an
antihistaminic
and
antibacterial
cream!

The composition of 'Phenergan' cream has been modified. The result—a more versatile and effective preparation.
The improved cream now contains 2 per cent w/w promethazine base *plus* 0·15 per cent dibromopropamidine isethionate—and in a slightly softer water-miscible base which allows it to be spread more easily. This new preparation has the same indications as the original antihistamine cream so far as skin allergies and other dermatological conditions are concerned, but with the additional advantage that it will be able to prevent bacterial contamination of lesions, and deal with secondary infections should they arise.
Supplies: Tubes of 1 oz. and containers of 1 lb
AN M&B brand MEDICAL PRODUCT

manufactured by MAY & BAKER LTD

distributors MAY & BAKER (AUSTRALIA) (PTY.) LTD
5 Phillip Street, Sydney. Tel. BW 6092, 2196
266 Lygon Street, Carlton N.3, Melbourne. Tel. FJ 5780

Registered at the G.P.O., Sydney, for transmission by post as a newspaper.



Depot preparation
with corpus luteum hormone action

- A clear, oily solution
- Reliable depot effect for 1 week

INDICATIONS:

All cases which require a corpus luteum hormone action for at least one week or more, i. e.:
functional bleedings (juvenile and pre-climacteric bleedings) abortion

Original Packing: 1 ampoule of 1 cc. = 65 mg / 1 ampoule of 1 cc. = 125 mg

SCHERING A.G. BERLIN / GERMANY

DISTRIBUTORS: SCHERING PTY. LTD., SYDNEY, AUSTRALIA

THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—42ND YEAR SYDNEY, SATURDAY, JANUARY 22, 1955 No. 4

Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— Page.
The Halford Oration—The Possible Relationship of Lipids to Atherosclerosis, by H. W. Florey .. 89
The Contribution of Radiotherapy to the Treatment of Cancer of the Bladder, by Alan J. M. Nelson 94
The Management of Indolent Ulceration of the Leg, by Neville C. Davis, M.B., B.S., F.R.C.S., and Frank Garlick, M.B., B.S. 97
The Inflamed Appendix Abnormally Situated in the Abdominal Cavity, by Thomas F. Rose 102
The Relationship of the Anterior End of the Ventricles to the Skull, by Geoffrey Toakley, M.B., B.S., F.R.C.S. 104
The Use of the Fern Test for Infertility, by R. J. R. Lewis 105

REPORTS OF CASES—
An Unusual Cause of Intestinal Obstruction, by C. W. R. Price 106
Adrenogenital Syndrome: Reports of Two Illustrative Cases, by Leslie P. Wait 107
Patent Ductus Arteriosus in Infancy with Gross Cardiac Embarrassment, by Mostyn L. Powell 109

REVIEWS—
Radiology for Medical Students 111
Disorders of the Blood 111
The Intimate Problems of Women 111
Surgery of the Caecum and Colon 111
Text-Book of Ophthalmology 112
Cancer: Race and Geography 112

BOOKS RECEIVED 112

LEADING ARTICLES—
The Ideal Exercise 113

CURRENT COMMENT—
Cortisone and the Management of Progressive Exophthalmos 114
The Treatment of Acute Hæmatogenous Osteomyelitis 115

CURRENT COMMENT—Continued. Page.
Bacterial Growth and the Exposure Treatment of Burns 115
A New Acid-Fast Bacillus in Swimming Pools .. 116
More Work with Less Effort 116
The History of Percussion 117
An X-Ray Study of the Proximal End of the Femur 117

ABSTRACTS FROM MEDICAL LITERATURE—
Ophthalmology 118
Oto-Rhino-Laryngology 119

CONGRESSES—
World Congress of Cardiology 120

OUT OF THE PAST 121

CORRESPONDENCE—
Caecostomy 121
Practitioners and Medical Benefits 122
Concerning Varicose Veins 122
Gardening and Cancer 122
Young Doctors and Specialization 122

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA 123

POST-GRADUATE WORK—
The Melbourne Medical Post-Graduate Committee 123
The College of Radiologists of Australasia 124

RESEARCH—
Royal Society of Medicine 124

DEATHS 124

MEDICAL APPOINTMENTS 124

DIARY FOR THE MONTH 124

MEDICAL APPOINTMENTS: IMPORTANT NOTICE .. 124

EDITORIAL NOTICES 124

The Halford Oration.[1]

THE POSSIBLE RELATIONSHIP OF LIPIDS TO ATHEROSCLEROSIS.

By H. W. FLOREY,
Oxford.

MAY I thank you very sincerely for the honour you have done me in inviting me to give the twentieth Halford Oration? The Oration, in the terms of the bequest establishing it, is "to commemorate the work and researches of George Britton Halford, first Professor of Physiology and Histology in the University", and "to bring before the public some recent work in the medical sciences".

It is obvious to all that the work of Halford, the man engaged to launch a new venture, has borne gratifying fruit, for not only does the Melbourne Medical School now enjoy an unrivalled reputation in Australia, but its products are highly esteemed elsewhere. It was not perhaps an accident that this very successful school was founded by a man who was the professor of anatomy, physiology and pathology when he arrived in Melbourne in December, 1862. Though, perhaps, this may sound a rather extraordinary number of subjects for one man to take charge of, there is little doubt that even in those days the method of study of and research in what are now sometimes loosely called the basic sciences of medicine was just as essential to medical practice as it is today. At the present time the distinctions between anatomy, physiology and pathology are tenuous, because a unifying experimental outlook is invading them more than ever and is now almost essential even for clinical research. It is perfectly true that at one end of the scale we find anatomists who are principally interested in the normal form of the structures of the human body, and at the other end pathologists whose interest is in the study of the morbid anatomy of disordered organs; but most additions to medical knowledge are now founded on experiments. I say this advisedly, for although it is true that observations of the greatest interest are made by clinicians on man considered both as a physiological animal and as a patient in hospital, the methods which are employed to elicit the rational explanations of diseased conditions can usually be traced to the activities of the physicist or the chemist, and to the employment of methods similar to those that have been evolved by the physiologist. Outside this generalization is the great domain of psychology and psychiatry, the importance of which is obvious to all. Though great strides have been made in the study of normal and abnormal psychology, it is probably not unfair to say that the methods for investigation used at present still await the development

[1] The twentieth Halford Oration, delivered at the University of Melbourne on July 29, 1954.

of techniques of greater precision. It is with particular pleasure that I have undertaken the honour of commemorating the signal services that Halford performed for this university, for I have a certain amount of confidence that with his background he might, if he were alive today, have some sympathy with the views I have just expressed.

Tonight I thought it might interest you to discuss some problems to which experimental methods may have much to contribute in the future, problems associated, particularly, with an aging population.

One of the main objects of medicine is to raise the quality of life and not merely to prolong it, and it can be argued that there has been not inconsiderable success in this pursuit. Largely as a result of the improvement in the conditions of life, such as the introduction of measures leading to the eradication of malaria in a number of areas, and improved prevention and treatment of infections, the average length of life is now considerably greater than it was at the beginning of the century; and not only can people expect to live longer than their predecessors, they can look forward to better health while still living. Nevertheless, the prolongation of life has brought the problem of an increasing population, for which, in many countries, methods of control will be required in the not very distant future. These problems, however, do not affect Australia directly; but what does influence medical practice and thought here, as well as elsewhere, is the increasing emphasis that must be laid on diseases occurring for the most part in aging tissues.

Today one of the most formidable causes of death and disability is cardio-vascular decay. Until recently such devastating diseases as arterial degenerations were looked upon as the inevitable accompaniment of increasing age, and it was considered that nothing was likely to be found that would influence the development of the lesions. It is perfectly true that at the present time nothing much can be done to treat or prevent them; but the attitude of mind towards such diseases as arteriosclerosis or, to be more specific, atherosclerosis, is changing. Those engaged in research are now more hopeful than they used to be that it may be possible to determine what causes atheromatous lesions in the arteries.

We have many excellent and exhaustive accounts of the morbid anatomy and histology of atheromatous lesions, but from all this wealth of knowledge it is not possible to deduce with certainty the pathogenesis of the lesions. What is certain is that the lesions contain lipids, in which are included cholesterol and its esters, phospholipids such as lecithin, sphingomyelin and cephalin, fatty acids and glycerides (Hirsch and Weinhouse, 1943). These substances undoubtedly accumulate in the lesions, but there is no general agreement on the histogenesis of the lesions themselves.

The most common view is that the primary lesion occurs in the connective tissue of the intima, and that lipids accumulate there because the tissues imbibe them from the blood plasma. The deposition of lipids is supposed to occur most readily when they are present in the blood in large amounts or as unstable complexes from which precipitates easily occur. An alternative hypothesis, which was originally put forward by Rokitansky, has been recently revived by Duguid (1946, 1948, 1954), who has assembled fresh evidence that atheromatous lesions start by the deposition of mural thrombi on the surface of the arterial intima. It is envisaged that these deposits are subsequently covered by endothelium, so that the thrombus appears to be outside the lumen of the vessel and to form part of the intima. The lipid which appears in the lesion is presumed to be derived from degenerative changes in the thrombus, which becomes partially organized.

Though these two hypotheses may at first sight appear to have little in common, there are some reasons for believing that lipid disorders may be involved in both. While the imbibition hypothesis focuses attention on the factors which control the stability in solution and the distribution of the plasma lipids, the formation of small mural thrombi may be associated with a relationship of plasma lipids to blood coagulation. That what may be called the imbibition and encrustation theories of the pathogenesis of atheroma have had adherents for a hundred years or so indicates the difficulty of reaching any firm ground to determine which, if either, is true. It may well turn out that both imbibition and thrombosis play a part in forming the lesions of human atheroma.

Of recent years much emphasis has been put on the theory that atherosclerosis is associated with errors of lipid distribution consequent on the failure of some unknown mechanism, a failure which can occur in quite young people, but is characteristically met with in patients of mature or old age.

In well-developed atheromatous lesions the lipid substances are qualitatively related to the lipids of the blood plasma, but they are not distributed in the same relative proportions. With progressive severity of the disease free cholesterol accumulates more rapidly than cholesterol esters, while the increase of phospholipid is due to the accumulation of lecithin and sphingomyelin, but not of cephalin (Buck and Rossiter, 1951). Whether these quantitative differences are of any real significance cannot be assessed at present—they have given no clear-cut insight into the origin of the lipids. There is, nevertheless, a close resemblance between the lipids of the plasma and those of the atheromatous lesions, and this has led to a search in the plasma constituents for signs of disordered lipid metabolism—in particular, that of cholesterol.

The bulk of the evidence that has been brought forward to connect disordered lipid metabolism with human atherosclerosis is of a clinico-pathological kind. This type of evidence suffers from two handicaps: the first is that the degree of atherosclerosis present in a living patient is difficult to assess by present techniques of clinical examination, and the second is that in studying a disease which is very common it is difficult to secure truly normal controls.

In spite of these difficulties there are fairly well founded observations that the incidence of atherosclerosis is reduced during circumstances in which the dietary intake of lipids is low. Thus during the last war, when in countries such as Norway and Finland there was a severe diminution in the intake of fat and cholesterol-containing foods, the mortality from arterial disease, including that affecting the heart, declined considerably, only to rise again when more of these foodstuffs became available. In countries such as the United States of America and Sweden, where there was little if any interference with the dietary intake, no such diminution was seen (Malmros, 1950; Morrison, 1952).

It might be thought that such differences could be correlated with the amount of lipids in the blood, and many attempts have been made to link an increase in the level of cholesterol in the blood with the tendency to atheromatous change. Little that is certain has come of these researches, but it seems likely that in some diseases in which the cholesterol level is appreciably raised, such as *diabetes mellitus*, nephrotic nephritis, severe hypothyroidism, and what has been called essential familial hypercholesterolæmia, patients appear to show earlier and more severe atherosclerosis than the general population.

Attempts have been made during recent years to refine the methods for examining the lipids and lipoproteins of plasma by the use of the ultracentrifuge. It is possible to separate a number of lipoprotein fractions from plasma and to characterize them by their flotation rate, for, being lighter than other plasma components, they rise under appropriate conditions during centrifugation.

This work of Gofman and his colleagues (Jones *et alii*, 1951) has led to the proposal that a graduated series of lipoproteins can be recognized in plasma, and that certain of them are present in higher concentrations in atherosclerotic patients. To distinguish them the lipoproteins were estimated in Svedberg units. In this instance, however, the unit is a measure of flotation and has been designated Sf.

It is claimed that the Sf 2 to 17 species form several discrete components, which on chemical analysis are found to contain cholesterol, phospholipid and protein. Above

the value Sf 17 there is a range of components containing increasing amounts of glyceryl ester up to Sf 40,000. The latter class were considered to be "the lipoproteins commonly known as chylomicrons". Above Sf 17 it is not possible to resolve discrete homogeneous components, and only lipoproteins above Sf 13 contain neutral fat.

The presence of these various components is affected by the absorption of fat from the alimentary canal, for there are only very small amounts of components above Sf 6 in normal man not absorbing fat.

In the disorders associated with atherosclerosis, such as diabetes, nephrosis and nephritis, there is an increased amount of Sf 10 to 20 components in the plasma, and components Sf 20 to 100 persist after a fatty meal in contrast with their rapid disappearance in a normal person.

It is also considered that the presence of lipoproteins of the Sf 10 to 20 class is related to the genesis of atherosclerosis in man, because their concentration is higher in patients who have had a coronary thrombosis than in normal persons.

These conclusions of Gofman and his collaborators have been criticized on statistical grounds by Keys (1951), who maintains that there is no greater evidence for correlation between the lipoprotein fractions and atherosclerosis than between total plasma cholesterol and atherosclerosis. Though Gofman has subsequently written to refute Keys's statements, the position is not by any means clear, as the views seem to rest on statistical arguments of somewhat doubtful validity.

Barr, Russ and Eder (1951) have produced some chemical evidence of abnormality in the distribution of proteins and lipids in the plasma of patients who have atherosclerosis. There is a reduction of albumin and α-lipoprotein, and both a relative and absolute increase in β-lipoprotein, compared with normal persons. These changes may be present without hypercholesterolæmia or any significant alteration of the cholesterol-phospholipid ratio of unfractionated plasma.

It can be said that clinical observation has contributed suggestive data, but nothing decisive. Can experiments on animals do better?

As in so many problems in experimental pathology related to human pathology, the great difficulty is to produce lesions in animals comparable to those in man. There are the well known experiments of Anitschkow, which have been many times repeated, in which he showed that feeding cholesterol to the rabbit caused a great increase in the blood level of cholesterol, and that in the course of some weeks lesions appeared in the aorta and other arteries bearing a close resemblance to atheroma in man. Unfortunately, in contradistinction to the disease in man, the cholesterol is also deposited in large amounts in many organs such as the spleen, and serious doubts have been raised as to whether the pathological process in the rabbit is the same as that in man. It has been suggested that rabbits, being herbivorous, differ from man in their reactions to an excess of dietary cholesterol.

It is, however, possible to produce classical atheromatous lesions in young fowls by cholesterol feeding alone, and in the dog this can be achieved if thiouracil is given at the same time (Steiner and Kendall, 1946; Steiner, Kendall and Bevans, 1949). It is also claimed that lesions can be produced in the same way in Cebus monkeys suffering from methionine deficiency (Mann, Andrus, McNally and Stare, 1953).

There would appear to be no reason to doubt that cholesterol feeding can, under appropriate conditions, cause atheroma in a number of species, but we are still left with no very clear idea as to what is happening. Gofman and his collaborators considered that cholesterol feeding in rabbits produced an altered pattern of the distribution of lipoproteins detectable by ultra-centrifugation. In fact, their studies on man were oriented by their findings in rabbits that there might be a correlation between the accumulation of lipoprotein molecules of the Sf 10 to 30 class in the blood and the development of experimental atherosclerosis.

One of the difficulties in understanding what happens when excess cholesterol is fed to an animal is that we have relatively little knowledge of what occurs to lipids in the blood-stream after their absorption from the alimentary tract. Clearly, any deposition of lipids in the walls of the arteries or elsewhere must be closely related to their degree of dispersion in body fluids.

A clue to a mechanism which may influence the degree of dispersion of plasma lipids was obtained by Hahn in 1943. He showed that the injection of heparin intravenously into dogs abolished the normal turbidity of the plasma following a fatty meal. Heparin itself does not, however, clarify lipæmic plasma when added *in vitro*, although plasma obtained from animals injected intravenously with heparin can do this. These observations led to the view that a "clearing factor" is formed in the blood following the injection of heparin (Anderson and Fawcett, 1950). This factor can modify the dispersion of lipids both *in vivo* and *in vitro*.

This work poses the question whether the "clearing factor" formed in the plasma following an injection of heparin has any physiological counterpart which plays a role in the normal dispersion of lipids absorbed from the gut, and if so, whether deficiencies in this mechanism can lead to abnormal lipid patterns in the plasma which might be associated with atherosclerosis.

I have been particularly fortunate during the last two or three years in collecting together a group of people who have, in my opinion, added substantially to our knowledge of events following the absorption of fat into the lymph of the intestine. These are my colleagues: French, a pathologist, Robinson, a biochemist, and Jeffries, a Rhodes Scholar from New Zealand, an ex-pupil of Professor J. C. Eccles. What I now have to say is the result of their work and thought (French, Robinson and Florey, 1953; Robinson and French, 1953; Jeffries, 1954; Robinson, Jeffries and French, 1954). Initially their work centred about the question of a physiological "clearing" mechanism. Lymph obtained by cannulating the thoracic duct of rats according to the method of Bollman, Cain and Grindlay was milky after the feeding of olive oil, owing to the presence of chylomicrons. The lymph, which was prevented from coagulating by sodium citrate, was added in appropriate amounts to plasma, so that a standard opacity, as measured in a Spekker photoelectric absorptiometer, was always obtained. With such material it was easy to confirm the observation that plasma obtained from a rat after intravenous injection of heparin could clear a suspension of chylomicrons.

This clearing reaction *in vitro* was shown to be associated with the splitting of the neutral fat of the chylomicrons with the release of fatty acid, which then becomes attached to the plasma albumin to form a water-soluble complex. Similar results have been reported by Shore and his colleagues (1953), who found that fatty acids were released from egg lipoproteins by the action of heparin-induced clearing factor.

The conditions affecting this action have been further analysed to show that the rate at which clearing of added chyle occurs in heparinized plasma is dependent on the amount of heparin injected up to a maximum of about 200 units per kilogram, but clearing will occur at a slow rate after the injection of very small quantities of heparin.

The observations were first made on plasma taken at an arbitrary time, fifteen minutes, after the injection of heparin, but clearing can be demonstrated after the injection of as little as 0·1 unit of heparin per kilogram, if the blood is collected from the rat within two minutes of the injection. From this result it can be calculated that the concentration of heparin in the plasma, immediately after an injection causing the appearance of the clearing factor, can be as low as 0·01 microgramme per millilitre of blood, which is certainly within the range at which heparin might appear under physiological conditions.

I have mentioned already that it has been observed that the fatty acid liberated during the clearing reaction attaches itself to the albumin of the plasma. It was found

that the amount of added chyle that could be cleared depended on the quantity of albumin present.

When the clearing of chyle by heparinized plasma is maximal, it can be calculated that six molecules of freed fatty acid are found in association with each molecule of plasma albumin.

One of the striking features of this clearing reaction is that the heparin has to be injected into an animal before the plasma shows any activity—the addition of heparin to plasma *in vitro* has no effect. The most reasonable explanation is that, in some way, the heparin in the blood-stream liberates, or combines with, some factor to produce an active lipase which then splits the neutral fat of the chylomicrons. Where is this clearing factor liberated? Experiments were performed in which blood containing heparin was perfused through a number of organs and the perfusate was tested for its content of clearing factor. It was found that the lungs, skin, subcutaneous tisssue and abdominal viscera, with the exception of the liver, produced clearing factor. The liver, however, destroyed it, for active blood perfused through this organ lost its activity. The clearing factor is formed very rapidly, certainly within one or two minutes of the injection of heparin.

The clearing of fatty plasma can easily be demonstrated *in vitro* with plasma from an animal injected with heparin. Can a clearing factor be demonstrated during normal fat absorption? The answer is, yes, and the result was arrived at as follows. Firstly, it was noted that plasma from rats which had received a normal diet up to the time of bleeding, but which had not been injected with heparin, could occasionally clear added milky chyle. It was then found that plasma from an animal which was absorbing fat contained a clearing agent, because the plasma, which was milky, cleared spontaneously on incubation at 37° C. If the fat was removed from such plasma by high-speed centrifugation immediately after it was obtained, the clarified plasma was able to dissolve fat when milky chyle was added.

Clearing activity was demonstrable in plasma within two hours of the administration of oil. It rose to a level of activity which persisted for a considerable period, the duration of which depended on the quantity of oil fed to the rat. Thus, after 0·5 millilitre of oil given by stomach tube, the raised level of clearing factor continued for about seven hours, while with half that quantity of oil the rate of clearing began to fall off at about five hours after feeding.

This demonstration of a physiological clearing action was extended by the discovery that the plasma of a rat was more active if it was collected five minutes after the tying of the thoracic duct during fat absorption, than in other circumstances. After the tying of the thoracic duct, which is passing fatty lymph into the blood in such quantities that the plasma is milky, the fat rapidly disappears from the blood and the plasma becomes clear. It is this clear plasma which has a very considerable capacity to clarify added milky chyle, though this ability is rather fleeting.

There is thus no reasonable doubt that there is a physiological clearing factor which appears when fatty chyle enters the blood-stream from the thoracic duct, but during fasting it is absent.

The question now arises whether the physiological clearing system just mentioned is the same as that which appears after the injection of heparin—or, in other words, whether the clearing system can be due to the physiological introduction of heparin into the blood from the cells which produce it.

It has not, so far, been possible to show directly that heparin is liberated into the blood-stream during fat absorption; but there are a number of observations that suggest that the clearing factor that appears after the injection of heparin is the same as that which occurs physiologically.

Both systems are very sensitive to temperature, the rate of loss of activity being the same at 37° C., while both are destroyed completely at 54° C. in three minutes. This instability may be partly responsible for the rapid fall in activity *in vivo* observed both after the ligature of the thoracic duct in an animal absorbing fat and after an injection of a small quantity of heparin into a starved rat.

There is a parallel increase in the rate of clearing with rise in temperature with both systems.

It was also shown that both systems have a similar dependence on pH, the maximal activity occurring between pH 7·2 and 7·6.

Of considerable significance is the comparison of the effect of inhibitors. Protamine was shown by Levy and Swank to inhibit *in vitro* the clearing of lipæmic plasma by heparinized plasma. My colleagues have shown that the inhibition of heparin clearing factor by protamine is precisely imitated when physiological factor is substituted.

Similarly both systems are equally inhibited by sodium taurocholate and by the detergent Triton WR-1339, which was shown by Brown, Boyle and Anfinsen to inhibit the clearing of an artificial lipoprotein substrate. Three other Triton derivatives were tested. These differed from one another in that one produced a pronounced lipæmia when injected into an animal, one produced none, and the third was intermediate between these two. The one producing lipæmia completely inhibited the clearing reaction *in vitro* of both heparinized and physiological plasma, the one that did not produce lipæmia had no effect, while the intermediate substance was partially inhibitory.

It was also found that fatty acid was liberated from chylomicrons by physiological clearing factor in the same way as by heparin factor, and that the fatty acid attached itself to the plasma albumin to form a soluble fatty acid-albumin complex.

Thus the physiological clearing factor in the rat appears to work in the same way as heparin-induced factor in all the tests so far applied. However, their identity is not yet established, for we do not know precisely what role heparin plays in the clearing reaction. For example, it is not at all certain that heparin is an active component of the clearing system. Its injection, or release into the blood under some physiological stimulus, may simply liberate some active factor from the capillary bed. It can be stated, however, that perfusion of blood from animals previously fed fat has shown that the active factor in post-absorption clearing is formed in the vascular bed of limbs and subcutaneous tissues in a way similar to that occurring when heparinized blood is perfused. It is suggestive that the tissues producing clearing factor have a high content of mast cells. Mast cells contain a highly sulphated muco-polysaccharide or, more probably, muco-protein, and are now generally considered to produce heparin.

This work may have given us the essential information to enable us to understand how chylomicrons leave the blood-stream after their entry through the thoracic duct. It has always been difficult to see how these particles could escape from the blood, for they are apparently not taken up by the reticulo-endothelium, and they are too large to pass unchanged through the capillary walls. The alteration of the large particles into a soluble albumin-fatty acid complex would make the situation more understandable; but even so, the complex must be split in some way after it passes from the blood-stream, for a calculation shows that the total amount of albumin in the blood of a rat could combine with only 12 milligrammes of fatty acid. Thus it is possible that the plasma albumin acts only as a transient acceptor of fatty acid.

So far we have considered only the neutral fat content of the chylomicrons, for the simple reason that there is at present little direct evidence about what happens to their other lipid components during the clearing reaction.

Chyle obtained from a rat, after it has been fed olive oil containing dissolved cholesterol, will become clear when heparinized plasma is added to it, although there is an increased concentration of cholesterol in the chylomicrons compared with those obtained after pure olive oil has been given. It appears, then, that cholesterol may be in some way involved in the clearing reaction; but this may

be a secondary effect, since it is known that there are complex interrelationships between the different plasma lipids. My colleagues have shown in this connexion that after heparinized rat plasma has cleared added fatty chyle, it has acquired the property of reducing the turbidity of a suspension of cholesterol, though this property is not shown by heparinized plasma alone. That is, the cholesterol is brought into solution by some mechanism which is dependent on the clearing reaction.

We can now return to a consideration of the ideas of Gofman and his colleagues that lipoproteins of high flotation rate enter the blood during fat absorption and are broken down in a stepwise manner to lipoproteins of increasing density, owing to an increase in the ratio of protein to lipid in the molecule. It is postulated that the conversion of these lipoprotein fractions in this way is a normal mechanism in fat transport, and that it is of particular interest because it is facilitated by the intravenous injection of heparin. However, the relationship of this work to the studies on chylomicrons is not clear, for chylomicrons are usually considered to be particles of emulsified lipid stabilized by a surface layer of protein. The clearing reaction has been interpreted as the hydrolysis of the neutral fat of these particles with the formation of a soluble fatty acid-albumin complex. During the course of this reaction particles of intermediate size are probably formed either from the residuum of the chylomicrons or by association of released lipid with the fatty acid-albumin complex. It may be that it is these intermediates which can be separated in the ultracentrifuge, and it seems unwise at present to discuss lipoprotein conversion as a specific chemical reaction which is brought about by clearing factor. These apparently complex changes in ultracentrifugal pattern may occur in any plasma which contains an active lipase.

Although knowledge about what happens to the chylomicrons in the plasma is still incomplete, suggestions have been made that some failure of the clearing mechanism may cause abnormal patterns of plasma lipid which are associated with atherosclerosis in man.

As I have stated at the beginning of the lecture, Gofman and his colleagues have emphasized the association of particular lipoprotein fractions with the formation of arterial lesions both in man and in cholesterol-fed rabbits. These lipoproteins, described as of the Sf 10 to 20 class, have a molecular weight of 3,000,000 and contain 30% by weight of cholesterol. The suggestion is that they accumulate because of a blockage in the chain of reactions which converts lipoproteins of high Sf number to low Sf number, and that this blockage can be corrected both in rabbits and in man by the injection of heparin.

That this apparent blockage occurs at a relatively late stage in the degradation of the chylomicrons is difficult to explain in terms of the clearing reaction. It suggests some failure in the disposal of the products of the reaction rather than lack of the clearing factor. Nevertheless, the claim that the block can be overcome by heparin injection raises again the question of what happens to cholesterol in clearing. Only further research can resolve this question.

From the experimental point of view, it might be thought that crucial evidence could be obtained from rabbits given atheroma by cholesterol feeding. Although the rabbit produces considerably less clearing activity than the rat after injection of a standard dose of heparin per kilogram of body weight, it is claimed that lipæmia, hypercholesterolæmia and the tendency to form intimal deposits of lipid are all reduced by heparin injection into the cholesterol-fed rabbit. This observation, if it can be supported by further clear-cut experiments, is obviously of great importance; but I think that the present published evidence leaves something to be desired.

Several investigators have reported that the reduction of alimentary lipæmia in man which follows an injection of heparin is significantly less in those with atherosclerosis than it is in normal persons, but at present there is no convincing evidence that heparin has any therapeutic value in man owing to an augmentation of the clearing reaction.

I have been able to do no more than indicate where some research is leading on the relationship of lipid disposal to atheroma; but, as I mentioned earlier, there is a further aspect to the matter. Is there a relationship between plasma lipids and thrombosis? Thrombosis, if not known for certain to be a cause, is frequently a complication of atherosclerosis. There is little published work on this, but there are some experiments on the coagulation of the blood *in vitro* which may be relevant. Macfarlane and his colleagues showed that plasma freed from fat by high-speed centrifugation or by extraction with carbon tetrachloride lost its power to coagulate in the presence of Russell's viper venom. This defect could be restored by a number of fatty substances including cream. Recently Fullerton *et alii* (1953) have shown that the ingestion of a fatty meal has a direct effect on blood coagulation. For example, a breakfast of bacon and eggs was followed by a shortening of the accelerated clotting time caused by the addition of Russell's viper venom, and by a shortening of the clotting time of the whole blood in siliconed tubes. These results have been confirmed by my colleague, Poole.

It is, of course, not certain that such changes occurring in the test-tube can be directly related to a tendency to intravascular thrombosis; but it is conceivable that lipid factors may have a controlling influence *in vivo* which is masked by many standard laboratory procedures for measuring coagulation of the blood.

We should not, perhaps, fall into the error of equating thrombosis with coagulation, for the process of thrombosis is in many ways quite different from coagulation. A thrombus forms in the first instance by the deposition of platelets on the walls of a vessel—quite a different process from clotting, though clotting of stagnant blood caused by blocking of a vessel may of course occur. Whether lipids have any relationship to the deposition of platelets or, as Duguid claims, small amounts of fibrin on arterial walls, awaits demonstration; but a satisfactory synthesis of most of the views held from time to time on the relationship between lipid metabolism and atherosclerosis would be achieved if it could be shown that fatty accumulation within the arterial intima is the factor which initiates the formation of mural thrombi.

I have not attempted to give a résumé of the multitude of observations on atheroma, but rather have picked out one or two points for special emphasis. There are, of course, many interesting phenomena that have to be explained; for example, why do women up to the age of about fifty years have so much less atheroma than men? Is this an effect of endocrine secretion? This is suggested because in the later years of life men and women suffer about equally from the disease.

Again, can the disease be fundamentally some dietary defect? A suggestion that this is a possibility has been furnished by Rinehart and Greenberg (1951), who found that prolonged pyridoxine deficiency in monkeys resulted in the formation of lesions in the intima of arteries which they thought were similar to those occurring in man. However, it does not seem likely that the disease in man can be due to a pyridoxine deficiency.

Then Hartroft, Ridout, Sellers and Best (1952) have recently shown that lipids accumulate in the aorta and coronary arteries of young rats fed on a lipid-rich but choline-deficient diet.

I believe that a further pursuit by a variety of experimental means of the cause of atheroma is well worth while, for the chemists and physicists have supplied us with many powerful weapons which may go a long way to solving the many problems associated with its development.

Acknowledgements.

I am greatly indebted to Dr. J. E. French, Dr. D. S. Robinson and Dr. J. C. F. Poole for assistance in the preparation of this lecture.

References.

ANDERSON, N. G., and FAWCETT, B. (1950), "Antichylomicronemic Substance Produced by Heparin Injection", *Proc. Soc. Exper. Biol. & Med.*, 74: 768.

BARR, D. P., RUSS, E. M., and EDER, H. A. (1951), "Protein-Lipid Relationships in Human Plasma; in Atherosclerosis and Related Conditions", *Am. J. Med.*, 11: 480.
BUCK, R. C., and ROSSITER, R. J. (1951), "Lipids of Normal and Atherosclerotic Aortas", *Arch. Path.*, 51: 224.
DUGUID, J. B. (1946), "Thrombosis as a Factor in the Pathogenesis of Coronary Atherosclerosis", *J. Path. & Bact.*, 58: 207.
DUGUID, J. B. (1948), "Thrombosis as a Factor in the Pathogenesis of Aortic Atherosclerosis", *J. Path. & Bact.*, 60: 57.
DUGUID, J. B. (1954), "Diet and Coronary Disease", *Lancet*, 1: 891.
FRENCH, J. E., ROBINSON, D. S., and FLOREY, H. W. (1953), "The Effect of the Intravenous Injection of Heparin on the Interaction of Chyle and Plasma in the Rat", *Quart. J. Exper. Physiol.*, 38: 101.
FULLERTON, H. W., DAVIE, W. J. A., and ANASTASOPOULOS, G. (1953), "Relationship of Alimentary Lipæmia to Blood Coagulability", *Brit. M. J.*, 2: 250.
HAHN, P. F. (1943), "Abolishment of Alimentary Lipemia Following Injection of Heparin", *Science*, 98: 19.
HARTROFT, W. S., RIDOUT, J. H., SELLERS, E. A., and BEST, C. H. (1952), "Atheromatous Changes in Aorta, Carotid and Coronary Arteries of Choline-Deficient Rats", *Proc. Soc. Exp. Biol.* (N.Y.), 81: 384.
HIRSCH, E. F., and WEINHOUSE, S. (1943), "Role of Lipids in Atherosclerosis", *Physiol. Rev.*, 23: 185.
JEFFRIES, G. H. (1954), "The Effect of Fat Absorption on the Interaction of Chyle and Plasma in the Rat", *Quart. J. Exper. Physiol.*, 39: 77.
JONES, H. B., and others (1951), "Lipoproteins in Atherosclerosis", *Am. J. Med.*, 11: 358.
KEYS, A. (1951), "'Giant Molecules' and Cholesterol in Relation to Atherosclerosis", *Johns Hopkins Hosp. Bull*, 88: 473.
MACFARLANE, R. G. P., TREVAN, J. W., and ATTWOOD, A. M. P. (1941), "Participation of a Fat-Soluble Substance in Coagulation of the Blood", *J. Physiol.*, 99: 70.
MALMROS, H. (1950), "Relation of Nutrition to Health; Statistical Study of Effect of War-Time on Arteriosclerosis, Cardiosclerosis, Tuberculosis and Diabetes", *Acta. med. scandinav.*, Suppl. 246: 137.
MANN, G. V., ANDRUS, S. B., MCNALLY, A., and STARE, F. J. (1953), "Experimental Atherosclerosis in Cebus Monkeys", *J. Exper. Med.*, 98: 195.
MORRISON, L. M. (1952), "Diet and Atherosclerosis", *Ann. Int. Med.*, 37: 1172.
RINEHART, J. F., and GREENBERG, L. D. (1951), "Pathogenesis of Experimental Arteriosclerosis in Pyroxidine Deficiency; with Notes on Similarities to Human Arteriosclerosis", *Arch. Path.*, 51: 12.
ROBINSON, D. S., and FRENCH, J. E. (1953), "The Role of Albumin in the Interaction of Chyle and Plasma in the Rat", *Quart. J. Exper. Physiol.*, 38: 233.
ROBINSON, D. S., JEFFRIES, G. H., and FRENCH, J. E. (1954), "Studies on the Interaction of Chyle and Plasma in the Rat", *Quart. J. Exper. Physiol.*, 39: 165.
SHORE, B., NICHOLS, A. V., and FREEMAN, N. K. (1953), "Evidence for Lipolytic Action by Human Plasma Obtained after Intravenous Administration of Heparin", *Proc. Soc. Exper. Biol.* (N.Y.), 83: 216.
STEINER, A., and KENDALL, F. E. (1946), "Atherosclerosis and Arteriosclerosis in Dogs Following Ingestion of Cholesterol and Thiouracil", *Arch. Path.*, 42: 433.
STEINER, A., KENDALL, F. E., and BEVANS, M. (1949), "Production of Arteriosclerosis in Dogs by Cholesterol and Thiouracil Feeding", *Am. Heart J.*, 38: 34.

The following are some recent reviews, not specifically referred to in the foregoing list, which contain many references to previous literature:

COMBINED STAFF CLINICS (1949), "Cholesterol Metabolism and Arteriosclerosis", *Am. J. Med.*, 6: 103.
DUFF, G. L., and MCMILLAN, G. C. (1951), "Pathology of Atherosclerosis", *Am. J. Med.*, 11: 92.
GOULD, R. G. (1951), "Lipid Metabolism and Atherosclerosis", *Am. J. Med.*, 11: 209.
GUBNER, R., and UNGERLEIDER, H. E. (1949), "Arteriosclerosis: A Statement of the Problem", *Am. J. Med.*, 6: 60.

THE CONTRIBUTION OF RADIOTHERAPY TO THE TREATMENT OF CANCER OF THE BLADDER.[1]

By ALAN J. M. NELSON,
Honorary Radiotherapist, Royal Perth Hospital, Perth.

THE place of radiotherapeutic methods in the treatment of cancer of the bladder has been well established for some time. Thus, by 1938, a series of 100 patients had been treated at the Holt Radium Institute, Manchester. Writing in 1943 on operative technique, Ogier Ward described the usefulness of radium implants in many types of cases which he deemed unsuitable for operation. There are quite a few series which indicate also that in those cases in which the condition is regarded as operable, very good curative results can be obtained. In 1913 Pasteau and Dagrais inserted radium through the urethra in a coudé catheter, and Young in 1915 devised an instrument whereby radium tubes might be introduced through the cystoscope and held against a bladder tumour. Deep X-ray therapy was not developed until the 1920's, but was not very effective until equipment improved and scientific control of dosage was introduced in the last two decades. In 1935 the work of Paterson and Parker in England and of Quimby in America set interstitial radium work for the first time on a simple and scientific basis. Since then the insertion of radon seeds or radium needles has been an accurate method. On the roof of the bladder partial cystectomy is readily performed, while radium insertion is more difficult. However, it may be said that in all cases of bladder cancer a radiotherapeutic method is applicable and should be considered when the plan of treatment of a patient is being decided. This is the attitude which is adopted in the urological clinic of the Royal Perth Hospital. Ralston Paterson, in his text-book "Treatment of Malignant Disease by Radium and Deep Therapy", suggests that radiotherapy is always preferable; but we have considered in consultation that in a certain number of cases surgical measures are preferable. No general rules can be made, because the cure rates show the same trends for both methods when stages are considered. Thus the patient with a papilliferous type of growth does well by both methods, while the presence of infiltration, particularly into the bladder muscle, or the report of anaplasia or Broder's third and fourth histological classification has an adverse effect on the result. When obvious extension or involvement of the glands is present, Ogier Ward advises an attempt at excision to relieve the patient of the distress of vesical carcinomatosis. The same palliation can often be obtained by X-ray therapy in this type of case, although by either method very few such patients are cured. Like surgery, radiotherapy is a local treatment and is subject to considerations of size and extent of spread, and of the danger of damaging vital organs. By the use of conventional deep X-ray therapy it is not possible to bring the whole pelvis to a satisfactory cancericidal dose without damaging the patient. The position in advanced cases has somewhat changed with the use of million-volt apparatus, as at Saint Bartholomew's Hospital and the Memorial Hospital, where an appreciable five-year cure rate has been obtained in this group. The recent development of the cobalt bomb makes it more possible that such therapy could be available in Perth in the future.

The other recent advance overseas has been the use of a balloon filled with radioactive sodium (Na^{24}) with a half-life of two days and emitting a powerful γ ray. For superficial growths the method has shown some promise, although previously the same type of technique, with the use of a central radium source in a "Sorbo" rubber ball, had been abandoned as unsatisfactory by at least two clinics. In Washington, Rose has used a single massive dose of X rays direct to the bladder mucosa during a cystostomy, taking precautions for asepsis, and for protection of surrounding tissues against irradiation. The results have been encouraging.

At the Royal Perth Hospital in the last five years a course of X-ray therapy has been adopted in 15 cases, mainly for palliation, but in some cases a radical approach has been used.

Interstitial irradiation has been employed in 17 cases during the same time, whilst a search of the operation records reveals that nine cystectomies or partial cystectomies have been performed in this period. Nine patients in private practice have been treated by seeds or needles during this time. In the majority of these cases radon seeds have been used in accordance with the technique adopted in Manchester, implanted through a cystostomy opening in collaboration with the urologist. In one case in which the tumour was tiny and the patient very large, the technique was varied by inserting the seeds with a special long seed gun through the panendoscope. The patient was apparently cured; but this technical variation has limited application, as it is almost impossible to implant the seeds with complete accuracy.

[1] Read at a meeting of the honorary medical staff of the Royal Perth Hospital, July, 1953.

In other cases radium needles were used, both in the mucosa through a cystostomy wound, or extravesically, the bladder being opened for guidance. In two cases this method was varied by the extravesical insertion of radium needles with the bladder unopened, guidance being provided by the urologist, who, using a cystoscope, observed the needles gliding under the mucosa. Both tumours were on the fundus, where implantation might otherwise have been difficult, both patients did very well, and in addition the post-operative recovery was swift; nevertheless the method presented a number of problems difficult to be overcome. It is very hard to feel the growth from outside when the bladder is distended, and the nudge of the cystoscope as it indicates the site is not so easy to interpret as might be thought, so that the precise outline of the growth on the outer wall is difficult to visualize. The cystoscope can only determine the visual evidence of extension; the actual tumour may be larger than appears, and it is essential to make the zone of irradiated tissue about one centimetre wider than the obvious extent, whatever mode of implant is used. When size and site have been agreed upon, the insertion of the first needle dents in the wall of the distended bladder, and the tumour suddenly disappears from view at the very time when guidance is required. When next the cystoscopist visualizes the cancer, the needle can be seen bulging the mucosa. Then the difficulty arises of describing the site and direction of the needle, which, of course, is still buried, from one collaborator to the other, and of making the decision whether it is right and, if not, where to move it. It is fairly easy to place the needles in a satisfactory pattern, but it is harder to be sure that they are irradiating the tumour. At present this may be regarded as an experimental method worthy of further trial in selected cases.

Overseas Reports of the Effectiveness of X-Ray Therapy.

The Holt Radium Institute reported 17 patients treated by deep X-ray therapy, 10 having growths in the late stages. Five of these patients survived for five years.

Cantril and Buschke, using 800 kilovolts, treated 61 patients with advanced disease, many having post-operative recurrences. Nine of these remained free of disease for five years or more.

Goin and Hoffman irradiated 31 patients with early lesions with contact therapy through the open bladder. Nine were alive, free of cancer, three to five years after treatment, and another two had died free of cancer. Ten others were still alive for one to three years, but still with cancer.

Weyde in Oslo treated 59 patients with X-ray therapy, and eight were free of disease from eight months to seven years after. These were rejects from the primary method of treatment, which was by surgery *plus* post-operative X-ray therapy, and which had apparently cured about one-third of the 35 selected from the whole group.

Results of X-ray Therapy at the Royal Perth Hospital.

At the Royal Perth Hospital there are 15 cases for consideration over the last five years. In three cases a course of treatment was given immediately after cystectomy. One of these patients has died, but two are alive a little over a year later.

Ten patients with undoubted active carcinoma were treated. One of these tumours was a large papilloma regarded as innocent until proven otherwise by biopsy. One patient could not be traced. Four patients died of the disease within one or two years. In one case the condition cleared up, but the patient was then lost sight of. The other four patients were reported as free from disease, but after two years one developed gross recurrence, and after further attempts at surgical treatment he died. Small papillomata appeared in the other three at intervals of two, three and six years respectively, and so far these have been controlled by diathermy.

Two patients were treated for multiple and recurrent papillomata. Though these are sometimes regarded as innocent tumours, there are at least three cases in the series in which such lesions were in fact malignant. This group is therefore included. One patient was relieved for three years, but in the other further papillomata developed after a few years. One of these cases comprised part of a series recently published in this journal, in which it was shown that by a fairly intense course of deep X-ray therapy directed to the whole bladder, the papillomata, like papillomata in other parts of the body, would completely disappear, leaving the bladder wall apparently normal. It was interesting to note that in all but one case, after about twelve months the papillomata began to reappear, slowly but regularly. This suggested the continuing action of an ætiological agent perhaps carried in the urine. In their series, Buschke and Cantril noticed, in some of the cases of successfully treated papillary carcinomata, the occurrence of further papillomata after a period of some years. This tendency was apparently not so pronounced in the infiltrating types. The same phenomenon is seen in the results of X-ray therapy at this hospital. This brings into doubt the long-term value of X-ray therapy as a method. Nevertheless, this review does indicate that X-ray therapy has considerable value in palliation and also provides a chance of salvaging occasional otherwise hopeless cases.

Treatment by Interstitial Methods.

Overseas Results.

Because buried radium is more readily applicable to the bladder than deep X-ray therapy, and with its smaller irradiated volume of tissue a higher dose can be tolerated it is universally chosen as the radiotherapeutic technique for smaller and curable growths.

Lenz, Cahill *et alii*, of New York, treated 44 patients with needles, with a cure rate of 25% over five to fifteen years.

Jacobs, of Glasgow, also used needles in 110 cases. Ten patients died of intercurrent disease a few years after, but after five years there were 37 (35%) alive and free from cancer.

Barringer, of New York, reported on 255 patients with proven cancer treated by radon seeds; 35% were well after five years. Interestingly, when the series was divided up, the results were as follows: papillary cancers, 52% of patients cured; infiltrating cancers, 23% cured.

Millen, of Manchester, treated 94 patients by the implantation of radon seeds, with a five-year survival rate of 42%; with papillary cancers the rate was 60%, with infiltrating cancers 15%.

It is not the purpose of this paper to raise the question of comparison of methods, but the figures suggest that the interstitial irradiation method has a high degree of reliability. The results at this hospital would tend to confirm this impression. Unlike X-ray therapy results, there is no evidence in our experience or in the literature to suggest that new recurrent papillomata follow radium treatment.

Technique.

The technique, based on that of the Holt Radium Institute, will be described. First of all, the diagnosis and the method of treatment must be decided before the bladder is opened. This means a degree of collaboration between urologist and radiotherapist which has been readily forthcoming. If X-ray therapy is used, an intact bladder is preferable. This decision is made if there are more than three lesions, if the lesion is larger than four centimetres in diameter, or if spread beyond the bladder can be clinically demonstrated. If there is doubt about diagnosis or procedure, the radiotherapist should bring radium to the cystotomy and help to make the decision at that time. It is very difficult to implant radium satisfactorily if the bladder is reopened after a previous cystotomy. We have found that when there is still doubt about malignancy of the growth at cystotomy, it is best to implant the radium, and biopsy usually confirms the wisdom of this procedure. Paterson advises that if the growth is found to be very

large, the implantation should not be carried out in spite of all preparations having been made. In our experience, proceeding with implantation in such cases has not greatly benefited the patient. A supply of radon seeds, each of one millicurie, is taken. They are implanted in a circle about one centimetre clear of the tumour, one-third of the radium being distributed over the inside of the circle. The number of seeds for each size is worked out in advance. The growth is exposed and, if necessary, flattened with the diathermy. With seed guns, the seeds are inserted in a single plane. A circular slab one centimetre thick is thereby irradiated to a cancericidal dose. The seeds are not removed, because after two weeks their radioactivity has largely disappeared. In the reports from Manchester the results obtained in infiltrating tumours are not good, and from a theoretical point of view we saw a weakness in treating these tumours this way. Therefore, in recent cases of cancer of infiltrating type the lateral wall of the bladder has been exposed by separation from the lateral wall of the pelvis and additional seeds have been implanted into any palpable extension or into the site of anticipated extension. The value of this procedure has not yet been established.

After the operation, radiographs of the pelvis are taken to check the accuracy of implantation. These prove that plenty of practice is required to obtain proficiency.

In certain cases seeds were not available, so small threaded needles were used according to the same principles, a rectangular pattern usually being employed, the threads coming out through the cystostomy wound. Although workers in certain clinics have made this a routine method, we noted as a disadvantage that the bladder reaction was more pronounced and there was a necessary delay before closure of the bladder could be contemplated. There was a danger of displacement of the needles, and in one case the thread broke during the removal of a needle, so we have preferred seeds. Many of these disadvantages are overcome when the needles are placed extravesically. With one finger in the bladder on the tumour, the needles are readily inserted into the outer wall of the bladder, and any extension can be recognized and dealt with. The tissues are very mobile, and allowance must be made for subsequent changes in the position of the viscus. However, it is not so easy to adapt the pattern of needles to different sizes of tumours as it is with seeds, and the final plan cannot be made until the tissues are measured with a small ruler. After the subsequent radiographs have been inspected the dosage rate of the implant can be calculated, and if necessary the time of withdrawal, which is usually about six days, can be varied. After the implantation of radon seeds or the extravesical insertion of radium, immediate consideration can be given to the problem of closing the bladder.

Results of Interstitial Radium Implantation at this Hospital.

We present 26 cases of bladder cancer treated by the interstitial implantation of radium, in 14 by radon seeds and in 12 by radium needles. It will be seen that more than half the patients are alive and well from one to four years after treatment, and if the advanced cases are excluded the method shows great promise.

Of 14 cases in which radon seeds were used, three were advanced. One tumour was two and a half inches in diameter, another was infiltrating the bladder wall after a limited operation. Both patients died. The third case was one of extension from a plaque recurrence of carcinoma of the colon, but was treated by identical technique. Although there were extensive growths in the bladder, the bladder has been free of disease and the patient well for over two years.

In the remaining 11 cases the tumours were four centimetres or less in diameter. One patient had two small cancers. One patient died soon after treatment. One came back with secondary deposits in the pelvis after one year. Two patients got recurrences after a year. One of these had some deep X-ray therapy and has lived for three years with cancer; the other died with massive recurrence. The others are alive with no recurrence. Thus, out of the 14 patients, one has lived for four years, two for three years, three for two years, one for one year, and one for three months—a total of eight alive and well.

Eight patients had intravesical implantation of radium. In three cases the tumours were very advanced, involving two sides of the viscus or with obvious extension. One other patient had had a partial excision earlier. All four patients died. In the other four cases the tumours were smaller, and the patients have been alive and free of cancer, one for four years, two for three years, and one for two years. The last-mentioned recently had a tiny recurrence, which disappeared on diathermy.

Two patients had extravesical insertion of radium. One was not followed, but the growth was fairly extensive. The other after one year has some dysuria due to a late effect of irradiation.

The two patients who had radium implanted under cystoscopic control are well after one year and eighteen months respectively.

Sequelæ.

The following late results have been observed. Usually the mucosa looks pale or normal where the tumour has been. Seeds can often be recognized. Sometimes an incrustation can be seen over one or more seeds. It is possible for a seed to form the nucleus of a vesical calculus, but in overseas experience this appears to be very uncommon. One patient underwent a prostatectomy a year after his radium implant, and on close inspection and palpation of the bladder wall the site could barely be recognized. In two cases a late ulcer has occurred at the site. In one case it was heavily encrusted. Symptoms were not severe and the condition cleared up. One patient, after X-ray treatment for papillomatosis, developed hæmaturia caused by a telangiectasis of the mucosa similar to that sometimes seen on the skin. This responded to diathermy and soon ceased to give further trouble.

Acknowledgements.

Most patients have been treated in collaboration with the urology clinic, and the enthusiasm and assistance of Dr. E. W. Kyle in this regard have been greatly appreciated. Some patients have been treated in general surgical clinics. The cooperation which has been shown in all clinics has been greatly appreciated and has made this presentation possible. The excellent work of the staff of the radium department in following up these patients for me, even to the Registrar of Deaths, should also be mentioned for appreciation.

References.

BARRINGER, B. S. (1947), "Twenty-Five Years of Radon Treatment of Cancer of the Bladder", *J.A.M.A.*, 135: 616.

BUSCHKE, F., and CANTRIL, S. T. (1946), "Indications for Roentgen Therapy of Bladder Carcinomas", *Surg., Gynec. & Obst.*, 82: 29.

GOIN, L. S., and HOFFMAN, E. F. (1945), "Contact Roentgen Therapy in Cancer of Bladder", *Am. J. Roentgenol.*, 54: 392.

JACOBS, A. (1949), "Carcinoma of Bladder; Treatment of Cancer of Bladder by Radium", *Brit. J. Radiol.*, 22: 393.

LENZ, M., CAHILL, G. F., MELICOW, M. M., and DONLAN, C. P. (1947), "Treatment of Cancer of Bladder by Radium Needles", *Am. J. Roentgenol.*, 58: 486.

MILLEN, J. L. E. (1949), "Carcinoma of Bladder; Treatment by Radon Seed Implantation and Deep X-Ray Therapy", *Brit. J. Radiol.*, 22: 402.

PATERSON, R. (1948), "The Treatment of Malignant Disease by Radium and X-Rays", Williams and Wilkins, Baltimore, 375.

TURNER, G. G. (1943), "Modern Operative Surgery", 3rd Edition, Cassell.

WARD, O. (1943), writing in "Modern Operative Surgery", Turner, G. G., *loco citato*, 2010.

WEYDE, R. (1945), "Treatment of Tumours of Urinary Bladder", *Acta radiol.*, 26: 589.

THE MANAGEMENT OF INDOLENT ULCERATION OF THE LEG.

By NEVILLE C. DAVIS, M.B., B.S., F.R.C.S.,
Surgical Supervisor, Brisbane Hospital,
AND
FRANK GARLICK, M.B., B.S.,
Senior Resident Medical Officer, Brisbane Hospital, Brisbane.

> And then look at the ulcers and dermatitis cases . . . they belong to the dermatologist. He is faced with a swarm of patients—an unfortunate, evil smelling group of sufferers, huddled in a room with remnants of Unna's paste and "Elasto", scattered about. Maybe he gives a quick look, and away to his clean office to smoke a cigarette and write "Rep" on the corresponding swarm of cards, and so on to his skin cases. It is all very strange. The ulcer and the dermatitis are the results of the varicose veins, and it would seem natural to put all under the care of the surgeon.
>
> —LAWES (1942).

WE have had the opportunity of studying this problem at the Brisbane Hospital leg ulcer clinic, where more than 300 new patients are seen each year. A special chart is completed for each new patient so that adequate records may be kept of the condition on presentation and of the subsequent progress. The chart shows the position of the ulcer on a drawing of the legs, and the following information: size and duration of the present ulcer, longest time taken for healing of previous ulcers, longest interval of freedom from ulcers, number of pregnancies, previous illnesses or operations, any history of deep venous thrombosis, presence or absence of pain, patient's weight, presence of superficial varices, condition of the arterial circulation, any œdema, structural changes in bones, joints or tendons.

We have studied in some detail 154 of these cases and believe that we are in a position to make some comments on the management of leg ulcers.

We will discuss our current views on the merits and demerits of the various supportive bandages and will indicate the technique of their application. In addition, we propose to examine critically the indications for surgery in chronic ulceration of the leg. As this condition is unlikely to cause the patient's death, careful consideration should be given to each case before a major surgical procedure is undertaken.

ÆTIOLOGY.

In a series of 154 consecutive cases of ulcer of the lower part of the leg, various ætiological factors came to light, which may be set out as follows: (i) presence of superficial varicosities (nothing else significant in history or examination), 58 cases (37%); (ii) history of deep venous thrombosis (with or without superficial varicosities), 45 (30%); (iii) bacterial infection of significant degree, seven (5%); (iv) occurrence in healed scars, 10 (7%); (v) evidence of arterial deficiency, seven (5%); (vi) fungous infection, two (1%); (vii) miscellaneous and undiagnosed, 25 (15%); total number of cases, 154. The main age incidence was sixty to seventy years. Females outnumbered males four to one.

DEFINITION.

The indolent ulcer, which we will discuss in most detail, is that seen on the lower half of the leg and variously referred to as gravitational, stasis, varicose or nutritional ulcer. It is a chronic, recurrent ulcer often associated with degenerative changes in the skin, subcutaneous tissues, tendons, and even bones and joints. The ultimate cause of many of these ulcers is unknown, yet it would appear to be associated in some way with abnormal venous pressure in the affected leg.

CLINICAL FEATURES.

Pain is not an important feature of these leg ulcers, and rarely does it persist once the ulcer has healed. In only 5% to 10% of cases is the pain of a bursting, throbbing or aching nature to the extent of disablement.

Œdema is variable, but rarely of the soft, pitting type. More often the leg is chronically indurated, or looks like the inverted wine bottle.

The appearance in our experience is not diagnostic.

TREATMENT.

The treatment of chronic leg ulcers will be discussed under the following headings: general measures, local applications, supportive bandages, physiotherapy, follow-up, surgical procedures.

General Measures.

It is generally acknowledged that rest in bed, particularly with the leg elevated, will heal any ulcer. This, as a generalization, is true; but an equally good result may be obtained in 95% of cases if some form of compression bandaging is applied and the patient remains ambulant.

A full clinical examination should be carried out in all cases to detect any associated condition—for example, anæmia or carcinoma—that may require treatment. Weight reduction is advised for obese patients.

Local Applications.

Control of infection is not, we believe, of primary concern in the treatment of these ulcers. It may assume importance, however, in one of two ways: (i) When cellulitis and regional lymphadenitis supervene on chronic ulceration. This complication requires rest and the systemic administration of antibiotics. (ii) When the ulcer is the result of a specific infection—for example, a fungus, *Mycobacterium ulcerans* or other organism—for which specific local treatment is indicated. Generally, we deprecate the local use of antibiotics for these ulcers unless we have grown on culture a pathogen which has been proved to be sensitive to a particular antibiotic. There is a definite risk that sensitivity to the antibiotic used locally will make the condition worse. We agree with Oldham (1951), who makes the following statement:

> Preliminary cleansing of the ulcer is quite unnecessary no matter how foul, how deep, or how long standing. The condition is essentially non-infective and there is nothing to be gained by the local application of antiseptics or antibiotics.

Pain will sometimes be relieved by sprinkling aspirin powder on the ulcer base, or by smearing the ulcer with ichthyol resin containing benzocaine (2% to 4%). Varicose eczema is treated by the application of a crude coal tar preparation—for example, *Unguentum Zinci Oxidi et Picis et Plumbi.*

Supportive Bandages.

Supportive bandages still remain foremost in the treatment of ulcers of the lower part of the leg (Wright, 1931). Although the principles of such conservative measures are well recognized, their practical application leaves much to be desired. Even as recently as 1950, at the annual meeting of the British Medical Association at Liverpool, it was stated to be "unfortunately still too true that simple occlusive bandaging methods are neither sufficiently well known nor properly practised" (McAusland, 1950). From recent experience, we believe that the majority of ulcers will quickly and satisfactorily heal with suitable pressure properly applied. Ulcers can be healed and their recurrence prevented if the œdema both in and around the ulcer is controlled.

"Elastoplast" Bandages.

When properly applied in suitable cases, "Elastoplast" bandages provide the most satisfactory form of support. Their main indication is in the treatment of a chronic recurrent ulcer on the lower two-thirds of the leg in a young or middle-aged person, especially if the leg is œdematous. The application of "Elastoplast is ill advised when (*a*) there is a history of "Elastoplast" sensitivity, (*b*) the patient is frail and elderly, (*c*) the arterial circu-

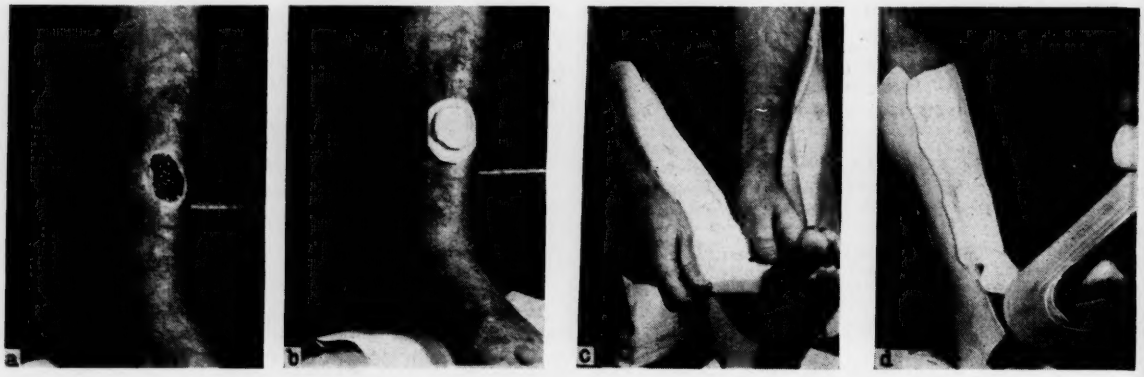


FIGURE IA.

(*a*) Leg shaved and painted with *Tinctura Benzoini Composita*. (*b*) Two chamfered adhesive felt pads placed on ulcer; no underlying dressing. (*c*) Four ventrical strips of "Elastoplast" applied. (Note that each strip is stretched transversely; nicks in the "Elastoplast" facilitate drainage of discharge.) Foot h eld at a right angle. (*d*) Spiral bandage commenced at metatarsal heads.

lation is deficient, (*d*) there is extensive weeping dermatitis of the leg.

Technique of Application.—There are several ways of applying the "Elastoplast" bandage, but the following account outlines the method we have found most satisfactory. (See Figures IA and IB.)

The whole leg is shaved, then painted with *Tinctura Benzoini Composita*, which helps to protect the skin from the "Elastoplast" and helps the latter to adhere better.

The ulcer is gently cleansed with any bland lotion, but in most cases no preparation or dressing is applied locally.

The foot being kept at right angles, four or five strips of "Elastoplast" about eight inches long are applied vertically to the leg extending on to the foot. As the strips are pressed on they are stretched transversely, and small nicks are made in their edges to prevent awkward curling. It is most essential to cover the ankle adequately, as these strips are designed to prevent the circular bandage from cutting in.

The circular bandage is begun at the metatarsal heads, the initial turns being made quite firmly, subsequent turns being applied with decreasing tightness. As to the degree of tension desirable, some authorities go so far as to say that the "Elastoplast" should be put on as tightly as a strong man can pull without tearing it. This may be an exaggeration, but it gives an indication of the degree of tightness desirable. Preliminary rest or elevation of the leg is unnecessary, as the elasticity of the "Elastoplast" will reduce the œdema and accommodate itself to the changing shape of the leg. However, when the leg is grossly œdematous, early change of the "Elastoplast" will be found necessary.

As each turn of the bandage is made, it should cover the preceding turn by half to two-thirds of the width of the bandage.

If much discharge is anticipated, its drainage may be facilitated by cutting half-inch slits in the "Elastoplast" overlying the ulcer. (Soon it is hoped to see the introduction into Australia of the porous "Elastoplast" bandage.)

Often it is desirable to have increased pressure locally over the ulcer itself. For example, an "Elastoplast" bandage may only lightly touch the ulcer, which remains defiant at the bottom of an old osteomyelitis scar or deep wound. In these cases a felt pad or even a pyramid of pads is helpful.

The pad in contact with the ulcer should overlap the whole circumference of the ulcer by approximately one-quarter to half an inch. It is carefully cut out, chamfered, then applied with the adhesive surface to the ulcer. Pads placed on top are cut a smaller size. If the edge of the pad catches the edge of the ulcer, the latter will rapidly extend; but on the other hand, too large a pad diffuses the pressure over too wide an area, with consequent loss of benefit.

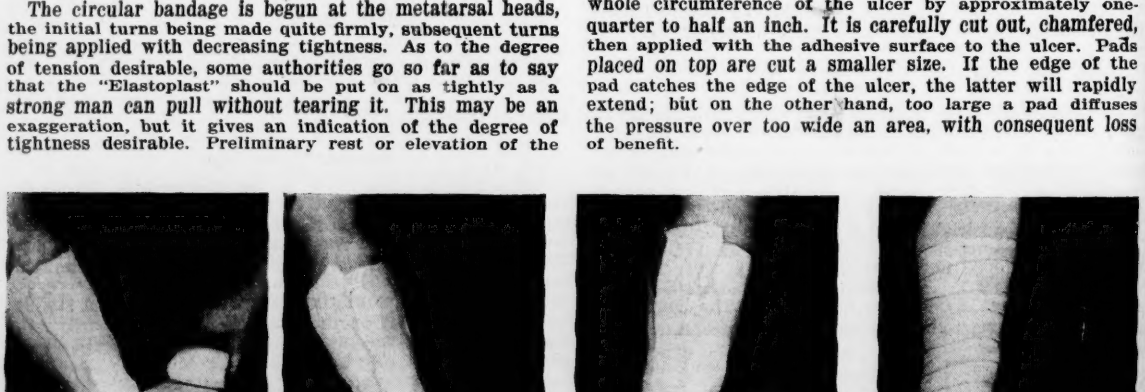


FIGURE IB.

(*e*) Ankle joint crossed obliquely. (*f*) Ankle region covered. (*g*) Constant firm pressure maintained in bandage. (*h*) "Elastoplast" bandage completed.

After the leg has been bandaged, the patient is given the following instructions: (i) He should rest with his leg elevated for twenty-four hours, then walk about and resume normal activities. Initially the bandage feels too tight, but should pain become progressively worse after twenty-four hours, the patient must return and have the bandage cut off. (ii) Bathing is permissible, but although it is not affected by occasional soakings, the "Elastoplast" is best kept as dry as possible. (iii) Discharge oozing through the bandage is not a cause for alarm. It should be wiped off with a moist cloth. (iv) Itchiness, likewise, may be alleviated by sponging the bandage with cold water. (v) The patient should return at the end of, or within, one week after the first "Elastoplast" bandage is applied, subsequent intervals between visits varying from three to six weeks. (vi) Under no circumstances should he interfere with his bandage.

When the time comes to remove the "Elastoplast", it will easily peel off after it has been cut down one side of the leg with scissors. There is little interference with the healing processes. The surface of the ulcer appears to be protected from the "Elastoplast" by a thin layer of discharge. The ulcer itself usually has sloping edges, with flat granulations and a filmy layer of epithelium at the inner margins. It has been stated that the healing time may be forecast (when "Elastoplast" is used) by the following formula (Figure II): (Area of ulcer in centimetres ÷ 5) + 3 = time in weeks. We have found this to be roughly true. Unless the ulcer shows improvement each time "Elastoplast" is reapplied, it is wrong policy to persist with the "Elastoplast". Rarely one finds the ulcer actually enlarging under the "Elastoplast" for no apparent reason.

FIGURE II.

Mrs. E., aged sixty-nine years, suffered a deep vein thrombosis in 1922. Since then ulcers have occurred over the right medial malleolus, the last remaining unhealed for five years. The ulcer was treated with felt and "Elastoplast" and healed in eight weeks.

Complications. — Complications do occur, but usually they are not serious. A true generalized reaction to "Elastoplast" is rare. We have seen only two such cases in our series. A local reaction is more common, and may take one of the following two forms. (*a*) "Elastoplast" sensitivity, in which there is weeping dermatitis of the whole leg. This may be prevented by winding "Elastoplast" on inside out. Vertical strips cannot be used now, so that the circular bandage cannot be applied with the same tightness. However, the result is usually quite satisfactory. To prevent stickiness the outer adhesive surface may be dusted with powder or rubbed with wool. The weeping dermatitis itself may be treated successfully by the application of an Unna's paste bandage. (*b*) Reaction to the discharge which has accumulated under the "Elastoplast". Commonly this takes the form of pustules around the ulcer. Such a reaction does not contraindicate the continued use of "Elastoplast".

Cutting into the leg with the edge of a circular turn, or a ridge in the bandage, is quite common. This is a fault in application, and its recurrence diminishes with experience. Enlargement of the ulcer may occur if the pad of felt is not properly applied or subsequently slips. The edge of the ulcer may slough under pressure should there be any arterial deficiency.

Nevertheless, "Elastoplast" has proved a most satisfactory bandage in our hands, used by itself or in combination with other materials (Figure II).

Unna's Paste Bandage.

Unna's paste contains gelatin, zinc oxide and glycerin, with minor modifications and additions. Usually a gauze bandage is used as a structural base, the final "cast" forming a soothing, pliable covering to the leg. However, as the bandage is inelastic, the final "cast" will not reduce œdema already present, but will prevent its further accumulation in the leg. The cast is much more effective when the final bandage is of crêpe and is applied very firmly while the Unna's paste is still moist.

Before applying an Unna's paste bandage, we cover the ulcer with a protective layer of *tulle gras*. We have found that Unna's paste, when dry, may adhere to and irritate the ulcer. After the local dressing, vertical strips are run up and down each side of the leg. The spiral bandage may be commenced at any spot, but during its application care should be exercised in allowing each turn to follow its own course without pleating or creasing. This necessitates cutting and recommencing the bandage several times until the initial layer is completed. Thereafter two to three gauze bandages (each three inches by six feet) are applied so that the final cast is reasonably thick and does not easily crack.

Occasionally, in the heat of Brisbane, people find a "squelching" feeling in their shoes somewhat disconcerting, while a few white dobs left behind with each footprint may be quite embarrassing. This tendency of the Unna's paste to melt in hot weather can be corrected by adding more gelatin to the mixture.

Indications.—Unna's paste bandages are indicated (*a*) when the ulcer is acutely inflamed, (*b*) when the ulcer is surrounded by much weeping dermatitis, (*c*) when the limb is relatively non-œdematous and non-indurated, (*d*) when the œdema has been reduced by rest in bed. Reactions are rare, but should they occur a "Simanite" bandage is a soothing substitute. "Viscopaste" is the proprietary counterpart of Unna's paste, while "Ichthopaste" contains in addition ichthammol (2%).

"Ceraban" Bandages.

"Ceraban" is a bandage similar to crêpe which has been impregnated with a lead preparation and nut oil. It is

a lighter bandage and less elastic than "Elastoplast", but on the other hand it is less likely to "cut in" or to produce adverse skin reaction.

We believe that it is indicated (*a*) for the chronic ulcer situated directly over the tibia (where too much pressure would make the ulcer worse), (*b*) for the elderly and frail patient, (c) for the patient with arterial insufficiency, (*d*) in the case of a severe reaction to "Elastoplast".

Because the bandage does not adhere well to skin, it is difficult to put on vertical strips initially. One should therefore be careful, when applying the spiral bandage, that it crosses the front of the ankle joint obliquely, without creasing.

The same points are important with "Ceraban" as with "Elastoplast". Commence at the metatarsal heads, keep the foot at right angles to the leg, bandage firmly, and overlap each preceding turn by at least half the bandage.

The resultant bandage is comfortable and rarely tight enough to cause pain. Healing is somewhat slower than with "Elastoplast", but complications rarely occur.

Diachylon "Elastocrepe".

Diachylon "Elastocrepe" is a bandage similar to "Ceraban", though non-adhesive. It, too, is impregnated with a lead preparation. The indications and technique of application are similar to those for "Ceraban", except that prior to use the bandage should be warmed.

"Simanite."

"Simanite" is a zinc and gelatin dressing together with silver manganite and glycerin impregnated in a gauze bandage. This soothing bandage is particularly useful for ulcers in the acute phase with severe skin reactions. It is applied in a manner similar to the Unna's paste bandage, but is best used in combination with some other bandage —for example, crêpe, Unna's paste or "Elastoplast". As yet we have not seen any reaction or untoward complications following its use.

Combination Bandages.

On occasions we have found the following combination to be most effective for an extensive ulcer with moist skin: one layer of "Simanite" bandage is wrapped around the whole leg, then a layer of sheet wool, then an ordinary gauze or Unna's paste bandage, and finally "Elastoplast" applied tightly. The result is not so bulky as it sounds and is remarkably comfortable.

Plaster of Paris.

Plaster of Paris is best reserved for the ulcer which occurs directly over the front of the ankle, in the actual creases. Such an ulcer is constantly aggravated by foot movements. The addition of a walking iron will help prevent the atrophy feared by Rowden Foote (1952).

Physiotherapy.

Physiotherapy is a valuable adjunct to bed rest in the acceleration of healing of ulcers. Most physiotherapy is based on Bisgaard's (1948) work. It consists essentially of local massage around the ulcer (to improve vascularity and tissue nutrition), with more general brisk massage to reduce œdema of the leg. Alternate elevation and depression of the limb further reduce œdema and improve vascular tone. In addition, the patient is advised to walk four miles a day.

Follow-Up Work.

Follow-up work is apt to be overlooked in the haste of a busy clinic, but its importance is not to be underrated. We should constantly remember that most ulcers can be healed—and that most recur. The practical problem of leg ulceration is the prevention of recurrence.

When the ulcer is healed, we explain to the patient how to look after his leg. He is handed a sheet of instructions, as follows:

LEG ULCER CLINIC.

Now that your ulcer has healed, you can help prevent its recurrence in several ways:

1. *Avoid swollen legs.* If you press your thumb into your leg and it leaves an imprint your leg is swollen. Get rid of the swelling by:
   - (*a*) *Wearing an elastic stocking.* If there is no heel in the stocking, sew a piece of tape from side to side below the heel to prevent rucking. Wash the stocking twice a week in warm water and dry in the shade. Kept well it should last 12-18 months.
   - (*b*) Wearing an elastic bandage. (Note, crepe and cotton bandages are unsatisfactory.) Apply the elastic bandage *firmly* each morning before rising, beginning at the toes and ending at the knee. Overlap each turn by at least half the width and lessen the pressure as you get near the knee.
   - (*c*) Resting for one hour during the day, in such a way that your feet are higher than your head.
2. Protect your legs with a bandage, or thick stocking, and try not to injure or knock them.
3. Keep your weight down to a minimum. Being overweight makes the ulcer worse. We will help you reduce with a diet sheet and tablets (*Amphetamine Sulphate*).
4. Report to the Ulcer Clinic immediately should the ulcer re-occur, and, in any case, every three months for a check up.

Surgical Procedures.

There are remarkably few indications for surgery in the management of indolent ulceration of the leg. However, if cases are carefully selected, a gratifying response may be obtained by surgical methods. The following methods will be discussed: treatment of superficial varicose veins, popliteal vein ligation, sympathectomy, excision and skin grafting.

Treatment of Superficial Varicose Veins.

Only 37% of the patients attending our ulcer clinic have associated superficial varicosities. Thus, even if they are the cause of the ulcer, true "varicose" ulceration is not as common as was originally thought (Anning, 1952).

We treat such patients with supportive bandages (for example, Unna's paste or "Elastoplast"), because they keep the veins under control as they heal the ulcer. Then, when the ulcer is almost healed and the œdema is reduced, we proceed to treat the incompetent veins by injection or operation.

Sclerosant therapy is indicated in those cases of varices unassociated with incompetent valves of the internal or external saphenous systems. Likewise, it may be of use when operation is contraindicated because of age or debilitating disease. We favour the sclerosant "P_2G" (Boots) (formula: phenol 2%, glycerin 30%, dextrose 25%, water to 100%), as it has no untoward toxic effects and will not cause pain or sloughing if injected outside the vein.

Operative treatment is indicated in all cases in which there are incompetent valves in the superficial venous system—in other words, when clinical tests show that there is retrograde flow of blood within the vein. If there has been a previous deep venous thrombosis, it is important to know whether recanalization has taken place. Phlebography and venous manometry will usually determine this. If the deep veins are not actually blocked, then it is safe to treat surgically, on their merits, any incompetent superficial veins.

We are careful to explore the sapheno-femoral junction and to resect the terminal inch of the internal saphenous vein with all the tributaries that enter it.

Likewise incompetence of the external saphenous vein or of communicating veins is sought for and treated.

We have found Rowden Foote's rough-headed needle of value in destroying the intima (Rowden Foote, 1952). This "nutmeg-grater" type of needle is passed down the vein

when it is divided and promotes thrombosis by mechanical abrasion. The thrombosis is increased in some cases by retrograde injection of the sclerosant "P_2G" below the knee.

We have used a modified Babcock's stripper for long straight varicose veins, but find it too rigid for general application.

Popliteal Vein Ligation.

In most cases, when deep veins become recanalized after thrombosis, they become incompetent, and it has recently been thought that ligation of these incompetent deep veins might have the same beneficial effect as ligation of incompetent superficial veins (Bauer, 1950).

It is well to remember that blood is squeezed out of the lower part of the leg by muscular contractions, and ligation of a large incompetent trunk like the popliteal vein may prevent the blood from flowing back again.

After popliteal vein ligation, it has been shown radiographically (in some cases) that calf muscle contractions drive the blood through numerous fine calibred channels into the muscle veins of the thigh, and that no back flow occurs (Kinmonth, 1952).

A major difficulty exists in the selection of suitable cases for this operation. We have used ascending and descending phlebograms, but consider them difficult to interpret. We tend to follow the rigid criteria laid down by Dow (1951), who considers an abnormal retrograde phlebogram as one in which are demonstrated tortuosity and irregularity of the vein wall as well as flow of the dye below the knee. In other words, we consider that definite structural changes should be visible, and that mere retrograde spread past valves is not enough.

Recently we have been investigating patients by studying the pressure changes of the surface veins of the foot as suggested by Walker and Longland (1950). We consider that venous manometry may be at least as helpful as phlebography in selecting patients for popliteal vein ligation.

The patient most likely to benefit from popliteal vein ligation is the one who complains of "bursting" pain in the lower part of the leg. This pain (which has been variously described as burning, deep, tight or shooting) comes on when the leg is dependent, and is typically relieved by elevation or exercise. Its probable cause is venous distension by blood at abnormal pressure. However, it should be noted that this characteristic pain is rare, particularly when the ulcer is healed.

We believe that popliteal vein ligation should be reserved for those cases in which the following criteria are fulfilled: (i) chronic indurative ulceration of the leg (without significant œdema), which has failed to respond to less radical treatment; (ii) severe and incapacitating pain of the "bursting" type, which persists when the ulcer is healed; (iii) history of deep venous thrombosis, with evidence of patency of the incompetent deep veins (this may be proved by ascending phlebograms following venous manometry, or by a tourniquet test below the knee); (iv) positive venographic evidence of dilatation and irregularity of outline of the popliteal vein.

It should be noted that those patients whose veins have not become recanalized after thrombosis suffer predominantly from deep venous obstruction, and their condition may be made worse by operation.

From a clinical standpoint, we believe those with "bursting" pains have a good chance of improvement, those with ulceration have a fair chance, and those with œdema alone may be made worse by operation.

In the past twelve months we have examined over 150 patients with indolent leg ulceration, and have found only one patient suitable for popliteal vein ligation. This patient had this operation performed on one side, and was so pleased with the result that she returned requesting that the operation be performed on the other leg, which was also ulcerated. Both legs have now been free of pain and ulceration for eighteen months (the longest interval of freedom for twenty years).

Up to date we have purposely been very rigid in our selection of patients for this operation, for fear of making some legs worse. Now we believe that manometry may help to exclude those patients, and indicate others for whom benefit may be expected.

Sympathectomy.

Removal of the lumbar sympathetic ganglia holds a controversial place in the management of leg ulceration. Its protagonists (Boyd, 1950) state that operation increases the blood flow in the diseased area and diminishes stasis in the capillaries. In addition, it keeps the skin of the leg in a healthier state by drying it. Its antagonists hold that operation interferes with the arteriolar constriction which should occur when a patient stands. This leads to increased capillary pressure, and in turn to increased tendency to œdema formation. In addition, it increases valvular incompetence by dilating veins as well as bringing more blood into a limb which already has difficulty in emptying itself.

In our practice, we advocate sympathectomy for those cases of ulceration (often painful) in which we think arterial insufficiency is the main cause. In our opinion, it has little place in the treatment of true gravitational or post-phlebitic ulcer.

Excision and Skin Grafting.

Plastic surgery to an indolent ulcer should not be considered until the cause—for example, venous or arterial insufficiency—has been enthusiastically treated. Then, if the ulcer and area of induration are circumscribed, excision and skin grafting may accelerate healing and provide a better cover than scar epithelium.

However, the method has limited application, as a considerable period of bed rest is required (which would go a long way towards healing the ulcer on its own account). In addition, it should be realized that, in most cases, post-operative supportive bandages are still necessary to prevent recurrence.

CONCLUSION.

In conclusion, it may be stated that there is no one pathological process, in the majority of cases, to which the ulceration may be attributed. This is not a specific condition for which any one cause can be invoked. The nutrition of the lower third of the leg and of the scar tissue which has already formed there depends on a number of separate and partially related factors. Some of these factors are not amenable to complete correction, while even the completely successful treatment of some of them may not in itself produce healing or guard against recurrence.

We believe with Rutter (1954) that if all these factors are resolutely and individually attacked and even only partially corrected, the overall balance of nutrition may be so favourably affected as to provide a stable scar which will stand up to the strain of everyday life.

SUMMARY.

1. In a series of 154 consecutive cases of indolent ulceration of the leg, there was a history of deep venous thrombosis in 30%. Superficial varicosities were present in 37%.

2. The control of infection is not of primary concern, unless the ulcer is due to a specific infection, or unless there is coexistent cellulitis.

3. Local applications, in general, are unimportant.

4. Supportive bandages will heal the majority of ulcers. The indications and technique of application of various bandages are described in detail.

5. The recurrence of ulceration may be prevented by instructions to the patient on how he should care for his legs.

6. When the ulcer is healed, incompetent varicose veins should be treated by injection or operation.

7. Popliteal vein ligation is rarely indicated.

8. Sympathectomy should be avoided except in cases of arterial insufficiency.

9. Plastic procedures will not be effective unless the underlying causes have been treated.

ACKNOWLEDGEMENTS.

We acknowledge with pleasure the help and advice received from Dr. A. D. D. Pye, General Superintendent of the Brisbane Hospital. Much of the routine work at the leg ulcer clinic has been carried out by Dr. J. Graff, Dr. K. Barnes and Dr. G. Ilett, whose efforts have been greatly appreciated.

REFERENCES.

ANNING, S. T. (1952), "The Cause and Treatment of Leg Ulcers", *Lancet*, 2: 789.

BAUER, G. (1950), "Division of Popliteal Vein in the Treatment of So-called Varicose Ulceration", *Brit. M. J.*, 2: 318.

BOYD, A. M. (1950), "Varicose Ulceration", *Brit. M. J.*, 2: 269.

BISGAARD, H. (1948), "Ulcers and Eczema of the Leg", Copenhagen.

DOW, J. D. (1951), "Venography of the Leg", *J. Fac. Radiologists*, 2: 180.

FOOTE, R. Rowden (1952), "Varicose Veins", Butterworth, London.

KINMONTH, J. B. (1952), "Surgical Progress (British Surgical Practice)", Butterworth, London, 188.

LAWES, C. H. W. (1942), "Varicose Veins in Peace and War", M. J. AUSTRALIA, 2: 499.

MCAUSLAND, S. (1950), "Importance of Bandaging", *Brit. M. J.*, 2: 270.

OLDHAM, J. B. (1951), "The Complications of Varicose Veins", *Practitioner*, 166: 236.

RUTTER, A. G. (1954), "Chronic Ulcer of the Leg in Young Subjects", *Surg., Gynec. & Obst.*, 98: 291.

WALKER, A. J. (1950), "Treatment of Post Phlebitic Leg and Application of Venous Pressure Measurement", *Brit. M. J.*, 2: 1307.

WRIGHT, A. DICKSON (1931), "The Treatment of Indolent Ulcer of the Leg", *Lancet*, 1: 457.

THE INFLAMED APPENDIX ABNORMALLY SITUATED IN THE ABDOMINAL CAVITY.

By THOMAS F. ROSE.

From the Department of Surgery, the Royal North Shore Hospital of Sydney.

THE diagnosis of appendicitis is not usually difficult if the caecum and appendix are in their normal situations—that is, the caecum in the right iliac fossa, the appendix in 96% of cases being either retrocaecal or pelvic in position (Wakeley and Gladstone, 1928). However, it may be very difficult if the inflamed appendix is unusually placed, owing to the anomalous symptoms and signs associated with it.

Based on a series of 1050 appendicectomies, this article deals with some unusual positions of the inflamed appendix, including the rare ectopic appendix. This latter is due to an abnormal position of the caecum, which occurred only twice in the 5000 cases investigated by Wakeley and Gladstone (1928). Since then, with the wider use of routine gastro-enterological studies, radiologists have shown us that abnormal positions of the appendix are far more common than was previously thought. For instance, in Figure I, a routine X-ray examination with an opaque enema revealed non-rotation of bowel, so that the caecum and appendix were situated in the lower part of the abdomen to the left of the mid-line. In Figure II, a routine X-ray examination with an opaque enema revealed a filling appendix attached to an undescended caecum.

Abnormal positions of the appendix may be classified as follows: (i) The caecum is in an abnormal position, so causing an ectopic appendix, (*a*) owing to transposition of viscera (Case I), (*b*) owing to anomalies of intestinal rotation—for instance, non-rotation, malrotation—so that the caecum lies in the left hypochondrium, as in Case II, or in the left iliac fossa, as in Case III, and non-descent of the caecum (Case IV). (ii) The caecum is in the normal position in the right iliac fossa, but the appendix is so long that the distal portion may be said to be ectopic (Cases V, VI, VII and VIII).

REPORTS OF CASES.

The Abnormally Placed Caecum.

There were two types of abnormally placed caecum—that due to transposition of viscera, and that due to anomalies of intestinal rotation.

Transposition of Viscera.

CASE I.—This was the only patient with complete transposition of viscera (abdominal and thoracic). For three years, this female patient, aged thirty-five years, had suffered from a recurrent colicky pain situated in the left iliac fossa. This was diagnosed as an appendiceal colic by many doctors as soon as they realized that her viscera were transposed. However, a pelvic examination showed that she also had a large left-sided ovarian cyst. This was removed, together with her fæcolith-filled, otherwise normal-looking appendix, with complete relief of symptoms.

Anomalies of Intestinal Rotation.

There were three patients with inflammation of the appendix in an ectopic position owing to some anomaly of intestinal rotation. In Cases II and III the appendix and caecum were in very unusual positions—the left hypochondrium and the left iliac fossa. In a third case (Case IV) the appendix was attached to an undescended caecum. This, of course, is a relatively common finding, and inflammation of such an appendix generally presents itself as ordinary acute appendicitis, save that the right-sided pain and tenderness are higher than usual, as in four other cases in this series not discussed here. However, this particular case is cited especially because it was unusual in that the inflamed appendix perfectly mimicked acute cholecystitis.

CASE II.—A male patient, aged sixty years, had a left-sided ectopic appendix due to malrotation of bowel. Ever since his service in World War I, this patient had had many attacks of "dysentery" characterized by the frequent passage of loose, yellow motions. These were accompanied by colicky abdominal pain in the upper part of the abdomen. No pathogens had ever been cultured from the stools, and his condition had been labelled as "colitis".

One year before his admission to hospital, an X-ray examination with an opaque enema was carried out elsewhere, but unfortunately the result was not available until after the operation. It showed that the ileum terminated in the caecum, which was situated behind the left costal margin. From the caecum, the colon went first to the right hypochondrium and then, describing a hairpin bend, returned to the left hypochondrium and then descended as the normal descending colon (Figure III). The appendix, which was not visualized radiologically, was later found to be lying in front of the caecum and apposed to the spleen. It was thus truly a "splenic appendix", similar to one described by Burgess (1921). During the four days prior to his admission to hospital, the patient complained of severe upper abdominal pain associated with vomiting and diarrhœa with watery motions. Colicky for two days, the pain then became a constant dull ache.

Examination of the patient on his admission to hospital showed him to be very ill; his temperature was 100° F., his pulse rate was 100 per minute, and his respirations numbered 20 per minute. His tongue was dry and furred. There was a large, hard, tender mass in the left hypochondrium projecting from below the costal margin. It was dull to percussion and did not move on respiration. The rest of the abdomen was moderately distended. The diagnosis was made of a pericolic abscess due to a colonic neoplasm or diverticulitis.

Laparotomy disclosed a large abscess full of foul pus from which *Bacterium coli* was later grown on culture. In it was a completely gangrenous appendix, which had ruptured in several places. Its base was attached to the caecum, which was lying behind the left costal margin. The lower pole of the spleen also presented in the abscess, whose boundaries were the left cupola of the diaphragm above and laterally, the stomach medially, the spleen and small bowel posteriorly, the costal margin and the anterior abdominal wall anteriorly. The remnants of the appendix were

ILLUSTRATIONS TO THE ARTICLE BY THOMAS F. ROSE.

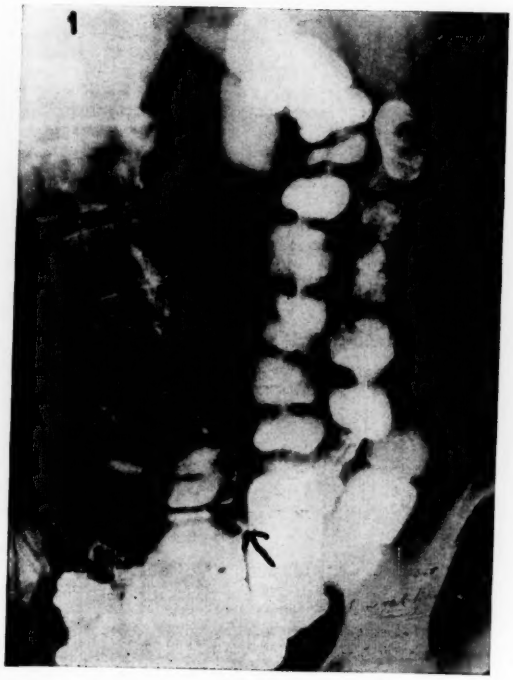


FIGURE I.
Non-rotation of bowel with the caecum and appendix on the left side of the abdomen. (The arrow points to the appendix.)

FIGURE III.
Caecum in the left hypochondrium. (The arrow points to the caecum.)

FIGURE II.
An undescended caecum and appendix. (The arrow points to the appendix.)

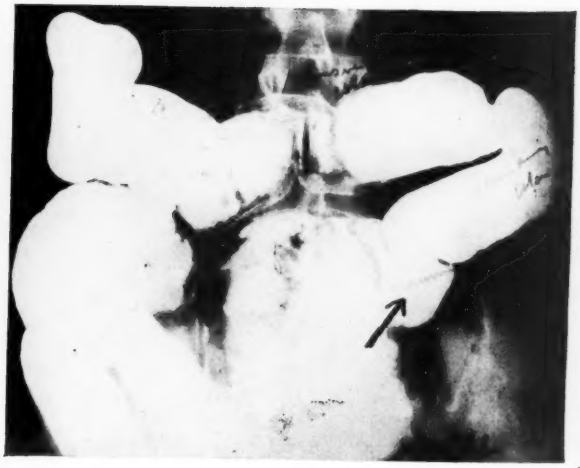


FIGURE IV.
Caecum in the left iliac fossa. (The arrow points to the caecum.)

XUM

ILLUSTRATIONS TO THE ARTICLE BY GEOFFREY TOAKLEY, M.B., B.S., F.R.C.S.

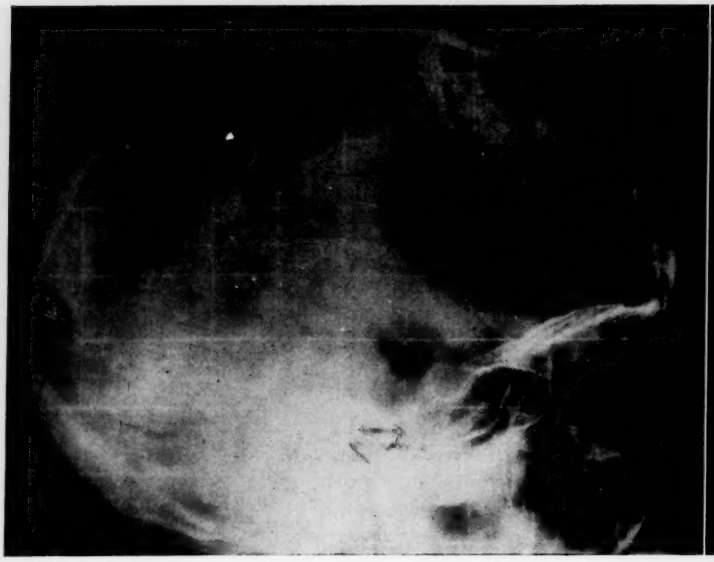


FIGURE I.

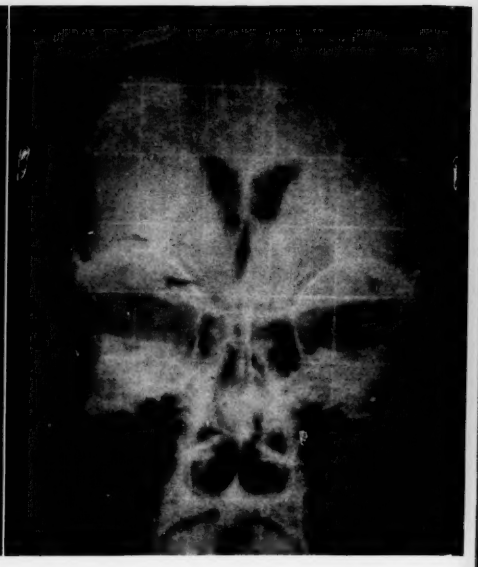


FIGURE II.

ILLUSTRATION TO THE ARTICLE BY R. J. R. LEWIS.

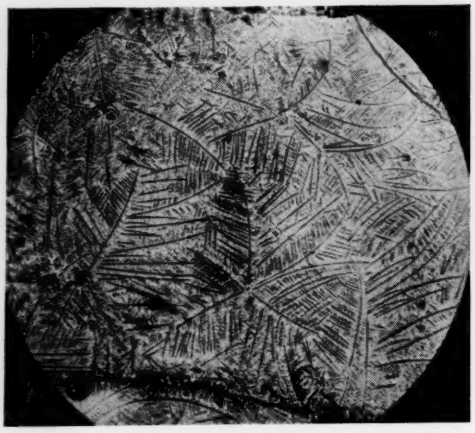


FIGURE I.

ILLUSTRATION TO THE ARTICLE BY C. W. R. PRICE.

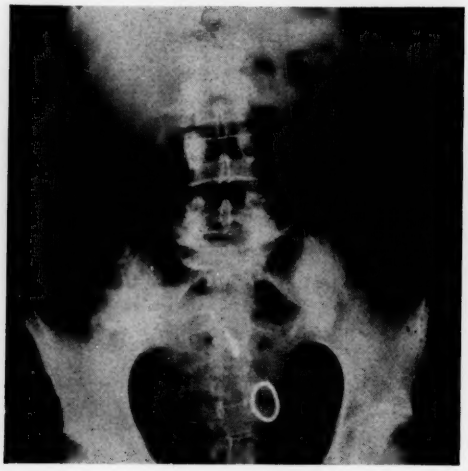


FIGURE I.

ILLUSTRATIONS TO THE ARTICLE BY LESLIE P. WAIT.

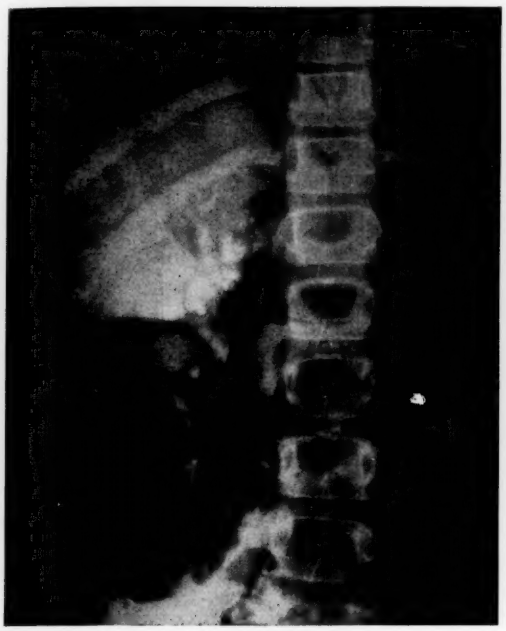


FIGURE II.

Case I. Radiograph taken after perirenal insufflation of air; calcium deposits in the field of a circular shadow above that of the right kidney.

FIGURE V.

Tomograph of the excretion pyelogram in Case I. The circular shadow of the adrenal tumour can be seen proximal to the left kidney, producing distortion of its upper calyx.

ILLUSTRATIONS TO THE ARTICLE BY MOSTYN L. POWELL.

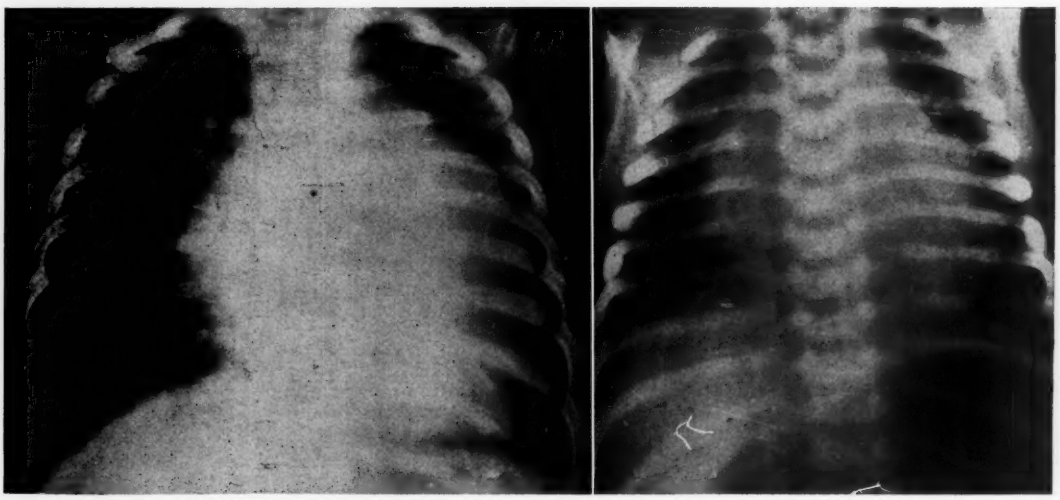


FIGURE I: The cardiac contour of a female patient, aged four months; atypical bruits, blood pressure 120 millimetres of mercury, systolic, 0 millimetres, diastolic, normal electrocardiogram, ductus six millimetres in diameter. FIGURE III: The cardiac contour of a female patient, aged four weeks, whose mother had suffered from rubella during her pregnancy; blood pressure 120 millimetres of mercury, systolic, 40 millimetres, diastolic, normal electrocardiogram, ductus six millimetres in diameter.

ILLUSTRATIONS TO THE ARTICLE BY MOSTYN L. POWELL.

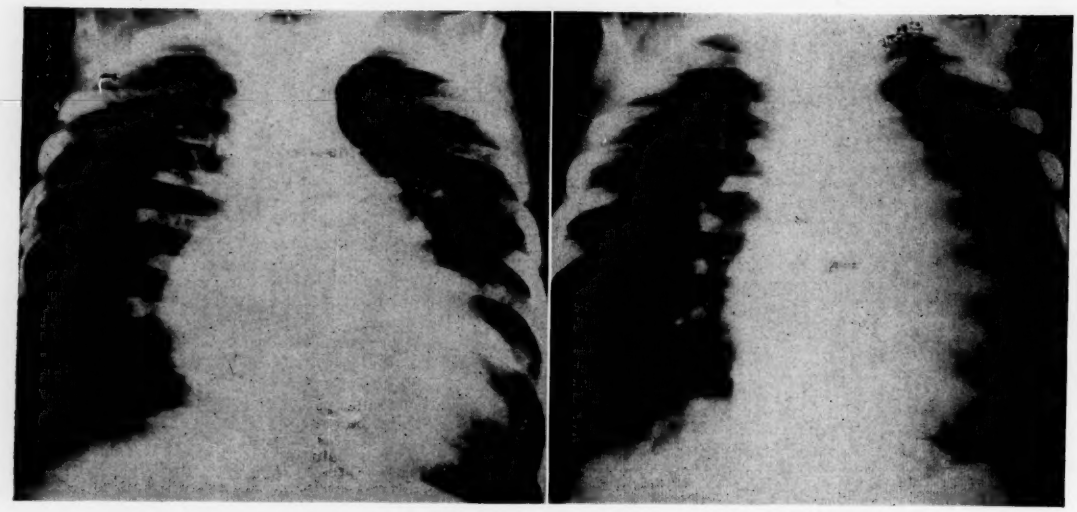


FIGURE IV: The cardiac contour of a female patient, aged seven months; atypical bruits, blood pressure 105 millimetres of mercury, systolic, 40 millimetres, diastolic, normal electrocardiogram, ductus nine millimetres in diameter.
FIGURE V: The cardiac contour of a female patient, aged eighteen months, weight 18 pounds, atypical bruits, normal electrocardiogram, ductus eight millimetres in diameter.

FIGURE VI: The cardiac contour of a female patient, aged eight months; atypical bruits, blood pressure 110 millimetres of mercury, systolic, 50 millimetres, diastolic, normal electrocardiogram, ductus 12 millimetres in diameter. Note patch of consolidation or collapse at apex of left lung. FIGURE VII: The cardiac contour of a male patient, aged three months; a more typical bruit than in the other cases, blood pressure 130 millimetres of mercury, systolic, 0 millimetres, diastolic, normal electrocardiogram, ductus seven millimetres in diameter.

removed. As the abscess cavity collapsed when the pus was removed, drainage was not instituted. Convalescence was complicated by a mild wound infection, and by an attack of bronchitis, to which the patient was prone.

At a follow-up examination two years later, the patient said that he now had normal motions with no further attacks of "colitis". However, one year after operation he had had an attack of pneumonia, and the associated coughing caused a wound hernia through the paramedian incision used for exploration. This is now to be repaired.

It is obvious that this patient had a "grumbling" appendix for many years; the diagnosis could have been helped by the X-ray examination made one year previously, had the film been available before operation.

Incidentally, this case illustrates the disadvantage of having to open an abdominal abscess or remove an infected viscus through a paramedian incision, as this procedure is prone to be followed by herniation should increased intra-abdominal pressure due to distension or coughing occur.

CASE III.—In this case the caecum and appendix were in the left iliac fossa, owing to malrotation of the large bowel. The patient, a female, aged eighteen years, had had an attack of acute appendicitis two and a half years previously. This was characterized by epigastric pain radiating to the right iliac fossa, with vomiting. After twelve hours she consulted her doctor, who operated; but even though he used first a McBurney and then a mid-line incision, he could not find the caecum or appendix. The attack subsided, but ever since then the patient had had similar attacks of pain and vomiting which were gradually becoming worse, the last having ceased two days before the present admission to hospital.

Examination of the patient disclosed tenderness in the right iliac fossa and high up on the right side of the rectum. X-ray examination with an opaque enema showed that the sigmoid colon had a redundant loop. The barium next filled the colon on the right side of the abdomen, then the transverse colon from right to left, and then it descended down the left side of the abdomen to the caecum, which was situated on the left side of the brim of the pelvis. The appendix was not visualized. The heart was in the normal position (Figure IV).

At operation, the caecum, with the appendix behind it, was found on the left side of the pelvic brim. The cause of this was that the large bowel had retained its mesentery in its primitive mid-line position and it was very long. The caecum and ascending colon had fallen to the left side of the abdomen, the descending colon to the right. The bowel was not fixed and could be moved anywhere at will. The terminal portion of the ileum went upwards and to the right. The appendix, at first retrocaecal, was so long that it crossed the pelvis to the right pelvic brim. It was thick-walled and bulbous in its distal half only, which was reddened as compared with the proximal half, which appeared normal. There were no contents and no periappendicular adhesions. The inflammatory process was obviously subsiding.

Appendicectomy was performed. Microscopic examination of the appendix showed that the proximal half was normal, but all coats of the distal half were replaced by inflammatory tissue. Convalescence was uneventful.

Although this was an ectopic appendix with the caecum on the left side, the appendix was so long that it crossed the mid-line so that its distal inflamed portion was on the right side of the abdomen. This explains why this patient's appendicular pain radiated to the right iliac fossa and not the left, and why the tenderness was in the right iliac fossa.

CASE IV.—The patient was a male, aged twenty-five years, who had an undescended caecum; his acutely inflamed retrocaecal appendix was in close apposition to the gall-bladder, liver and diaphragm. Eight hours prior to his admission to hospital, he had a sudden attack of epigastric pain radiating round to the right hypochondrium and the right side of the back. This recurred at half-hourly intervals and was accompanied by frequent vomiting. It was worse on inspiration, when he would gasp with the pain.

Examination of the patient showed that he had a temperature of 103° F. and a pulse rate of 120 per minute; his respirations numbered 35 per minute. His face was flushed, his tongue was furred and he appeared very ill. He was breathing rapidly and shallowly with the pain in his right hypochondrium. Tenderness and rigidity were present in the epigastrium and the right hypochondrium. The chest itself was normal.

The diagnosis appeared to be early acute cholecystitis, and operation was immediately performed. The gall-bladder and liver were found to be normal. However, a very swollen, tense, acutely inflamed appendix attached to an undescended caecum was found. Its tip was in apposition to the diaphragm, which was causing the shallow breathing. It lay behind the caecum and liver and in front of the kidney and duodenum.

Appendicectomy was performed. Convalescence was uneventful.

Had this patient been treated conservatively as suffering from acute cholecystitis, he might have fared as badly as or even worse than did the patient in Case VIII. A mistaken diagnosis is, of course, always the danger in the conservative treatment of any abdominal surgical lesion.

The Abnormally Long Appendix with the Caecum in the Normal Position.

Symptoms and signs due to the very long inflamed appendix will depend on the position of its distal part.

Four patients had such an inflamed appendix. In Case V a left-sided pelvic abscess was caused, and in Case VI a left-sided abdominal abscess. (These may be compared with Case III, in which a long appendix arising from a left-sided caecum caused right-sided symptoms and signs.) In Case VII the distal portion of the appendix was closely applied to the second part of the duodenum and caused a hæmatemesis, whereas in Case VIII it was close to the gall-bladder and mimicked acute cholecystitis.

CASE V.—A male patient, aged twenty years, had been ill for six days before his admission to hospital. In the first two days of his illness, he had frequent recurrent attacks of severe pain commencing in the umbilicus and radiating to the left iliac fossa. This pain caused much vomiting without relief of symptoms. In the following two days the pain eased, but was succeeded by rectal tenesmus with frequent loose bowel actions.

On his admission to hospital, he was very ill, with a temperature of 100° F. and a pulse rate of 100 per minute. There was tenderness above the pubis and in the left iliac fossa. On rectal examination a large, firm, tender mass was felt to the left of the rectum.

Operation revealed a large, left-sided pelvic abscess (from which *B. coli* was later grown on culture). This was caused by the acute inflammation and rupture of the distal half of an appendix which was obstructed by a fæcolith in its mid-length. The appendix was very long, crossing the pelvis in front of the rectum, down whose left side it then curled. The caecum was in its normal position. The appendix was removed and the abscess cavity drained. Convalescence was uneventful.

CASE VI.—A male patient, aged twenty-two years, had been well until three weeks prior to his admission to hospital, when he had recurrent attacks of mild generalized abdominal colic accompanied by vomiting. These attacks recurred every few hours and then settled down to a dull ache one week prior to his admission, when he also noticed a tender swelling in the lower part of his abdomen on the left side.

Examination showed the patient to be pale and ill, with a furred tongue, a temperature of 99° F., and a pulse rate of 90 per minute. In the left iliac fossa was a firm, tender mass which was attached to the ilium. The left hip was held flexed, and extension was limited by painful muscle spasm. A rectal examination gave normal findings. X-ray examination with an opaque enema disclosed a normal colon; but there was a soft-tissue shadow in the region of the swelling which was outside the bowel and displacing the colon medially.

At operation a large *B. coli* abscess was found overlying the left iliacus muscle. It was intraperitoneal and was due to rupture of the tip of the appendix, which stretched across the pelvis from the normally placed caecum. The distal half of the appendix was gangrenous owing to an impacted fæcolith. The appendix was removed and the abscess drained. Convalescence was uneventful.

CASE VII.—A male patient, aged thirty-four years, had suffered from attacks of epigastric pain with little relation to meals. X-ray examination with an opaque meal, carried out four days prior to his present illness, revealed "pylorospasm and an irritable duodenum". Eight hours before his

XUM

admission to hospital, the patient developed sudden severe epigastric pain radiating to the right side of the abdomen. This was accompanied by vomiting, with no relief of symptoms. Six hours later he had a moderately severe hæmatemesis, vomiting bright red blood.

Examination of the patient in hospital showed him to be very ill. His tongue was furred and dry, his temperature was 100° F., his pulse rate was 80 per minute, and his respirations numbered 20 per minute. Tenderness and rigidity were present in the epigastrium and in the right side of the abdomen. Considerable tenderness was also present in the right loin.

The diagnosis was made of a ruptured duodenal ulcer with hæmorrhage.

Operation disclosed a normal stomach and duodenum. However, the appendix was very long (eight inches) and was arising from an abnormally situated caecum. It travelled up behind the caecum, ascending colon and hepatic flexure, so that its distal inch was lying beside the second part of the duodenum. It was obstructed in its mid-length by a fæcolith, which had resulted in gangrene and rupture of its distal half. The adjacent duodenal wall was intensely inflamed and swollen.

Appendicectomy was performed. Convalescence was favourable except for a small hæmatemesis and wound hæmatoma on the second day.

Follow-up examination nine months later showed that the patient had been perfectly well since leaving hospital. A further X-ray examination with an opaque meal revealed a normal stomach and duodenum.

Aird (1949) mentions hæmatemesis due to an inflamed appendix lying near the stomach, and it is obvious that this patient's juxtaduodenal inflamed appendix caused his two hæmatemeses.

CASE VIII.—The patient was a male, aged twenty-seven years, who had an unusually long inflamed and perforated retro-colic appendix. This caused a high appendiceal abscess which, aided by two appendiceal calculi, simulated acute cholecystitis with gall-stones.

The patient was admitted to hospital with a five hours' history of epigastric colic, vomiting and loose bowel actions. On examination he did not seem very ill, though his tongue was furred. The only significant finding was epigastric tenderness. The following day the pain radiated to the right hypochondrium, and the temperature rose to 101° F. A vague, tender mass was now present in the right hypochondrium. A plain radiograph showed what appeared to be two gall-stones. As a consequence, cholecystography was thought to be unnecessary, especially as the patient did not feel well.

Conservative treatment was instituted; but as the mass slowly increased in size and his temperature rose to 102° F., on the fourth day after his admission to hospital the abdomen was explored. The gall-bladder was found to be normal, with no calculi. However, there was a large appendiceal abscess behind the hepatic flexure of the colon, due to a very long ruptured retrocolic appendix, the seat of suppurative appendicitis. In the abscess cavity were the two calcified fæcoliths seen on the X-ray film. These appendiceal calculi were removed, together with the appendix, which arose from a normally placed caecum.

Convalescence was uneventful.

Appendicular calculi or calcified fæcoliths, which may become laminated like other calculi, are uncommon. In addition to Case VIII, only two other patients in this series of 1050 appendectomies had an appendiceal calculus. Being radio-opaque, such calculi may mimic biliary or ureteric calculi, according to the position of the appendix. Thus X-ray examination when incomplete, as it may necessarily be in acute cases, may hinder rather than assist the true diagnosis, as it did in this case.

DISCUSSION.

In this series of 1050 appendicectomies there thus occurred 12 cases in which there was an abnormal situation of the inflamed appendix in the abdominal cavity. In eight the abnormality was due to the caecum being abnormally placed; these included one in which the viscera were transposed (Case I), two in which the bowel was malrotated (Cases II and III), and five in which the caecum was undescended (only one of which, Case IV, was detailed). In four cases (V, VI, VII and VIII) the caecum was in its normal position, but the appendix was unusually long.

It is seen, then, that the so-called "left-sided appendix", of which five instances were observed here, may occur in one of three ways: firstly, in transposition of the viscera (Case I); secondly, in malrotation of the bowel so that the caecum comes to lie on the left side of the abdomen (Cases II and III); thirdly, when an abnormally long appendix stretches across the abdominal cavity from a normally placed caecum (Cases V and VI).

These cases show that acute inflammation in these malplaced appendices may be dangerous, because their anomalous symptoms and signs cause difficulties in diagnosis and consequent delay in the patient's admission to hospital and treatment. A further danger is that these acutely inflamed appendices may mimic diseases of surrounding organs for which conservative treatment is at times justifiable (Cases IV and VIII).

Owing to tardy diagnosis, the inflammatory process is allowed to spread beyond the appendix. Fortunately, peritonitis did not ensue in the cases recorded here; but four of the six acutely inflamed appendices went on to abscess formation (Cases II, V, VI and VIII). Though the outcome in each was successful, the mortality (and morbidity) of patients suffering from an appendiceal abscess is still distressingly high (Rees, 1952).

However, even if the exact lesion cannot be diagnosed, all such cases should be recognized early as demanding urgent surgical intervention, if the adage is remembered that abdominal pain of ever-increasing intensity is a surgical emergency.

SUMMARY.

A discussion of the difficulties in diagnosis, and of the dangers of tardy treatment, of an abnormal position of the inflamed appendix in the abdomen is presented, illustrated by eight case reports.

It is pointed out that the appendix may be unusually placed because, firstly, the caecum is in an abnormal position, or secondly, the appendix is longer than usual, so that the distal portion is unusually placed.

ACKNOWLEDGEMENT.

I wish to thank Miss M. Simpson, clinical photographer to the Unit of Clinical Investigation, Royal North Shore Hospital of Sydney, for preparation of the radiographs for reproduction.

REFERENCES.

AIRD, I. (1949), "A Companion in Surgical Studies", *Livingstone, Edinburgh*, 709.

BURGESS, A. (1921), "Referred Pain", *Lancet*, 1: 559.

REES, W. (1952), "Fatal Appendicitis. The Decline in Mortality", *Lancet*, 2: 1199.

WAKELEY, C., and GLADSTONE, R. (1928), "The Relative Frequency of the Various Positions of the Vermiform Appendix as Ascertained by an Analysis of 5000 Cases", *Lancet*, 1: 178.

THE RELATIONSHIP OF THE ANTERIOR END OF THE VENTRICLES TO THE SKULL.

By GEOFFREY TOAKLEY, M.B., B.S. (Sydney), F.R.C.S. (England),

Honorary Neurosurgeon, Mater Misericordiæ Hospital, Brisbane.

PREFRONTAL LEUCOTOMY has become an accepted method of therapy in psychiatry. Its effect would appear to be bound up in section of the cortico-thalamic tracts followed by degeneration of medial dorsal nuclei of the thalamus (McLardy and Meyer, 1950).

Two methods of operation are generally used: (*a*) the open technique (topectomy and undercutting—Pool, 1949; McKissock, 1949); (*b*) the blind technique (lateral method of Freeman and Watts, 1950, McKissock, 1948, 1949, and

Dax and Radley-Smith, 1948; transorbital leucotomy of Freeman, 1949).

As the blind lateral method is the one most often used, an accurate method of siting the cut in front of the ventricles would help in the operation. From skull landmarks it is obviously impossible to be dogmatic about a point for making a burr hole, because of the diversity of skull types. In post-mortem examinations performed at the Mater Misericordiæ Hospital, Brisbane, it was found that a point widely used to site the cut (three centimetres behind the orbit and six centimetres vertically from this point at right angles to the orbito-meatal line) showed that the position of the anterior end of the ventricles varied from three centimetres behind the cut to two centimetres in front of it. A case quoted in a paper by Beck, McLardy and Meyer (1950) showed that a marker and the cut were found as far back as the putamen.

It would seem ideal if one could mark a position on the skull which would be anterior to the ventricle and yet as close to it as possible, for (*a*) in some cases the results of leucotomy appear to be influenced by its posterior position, and (*b*) the commonest cause of death (hæmorrhage) is influenced by the posterior position of the cut. Such a method of localization would perhaps also give some basis on which to compare the results of operation.

The changing position of the cut and the fibre section may have some bearing on the different results obtained in patients seemingly presenting the same psychiatric syndrome.

A simple technique for localizing the ventricles in relation to the skull can be based on air encephalography carried out prior to the leucotomy.

A lumbar encephalogram is taken by the use of some 20 to 30 cubic centimetres of oxygen. When the patient is placed in the brow-up position for lateral X-ray examination of the skull a piece of "Perspex" (which has been accurately scarred by vertical and horizontal lines at intervals of two centimetres with red lead rubbed into these lines) is placed between the plate and stationary Lysholm grid. The exposed X-ray film with the patient's orbito-meatal lines vertical will show the anterior end of the ventricles with superimposed two-centimetre squares on the film. The lines on the plate may now be used to locate the plane of leucotomy in relation to a bony landmark, such as the outer margin of the orbit or the fronto-nasal junction. This picture will give what is most needed—the plane of section (Figure I).

To go further, the distance for the cut in a medial direction can also be worked out. Two lead markers are placed on the lateral aspects of the skull over points just anterior to the ventricles, these points having been worked out by reference to the lateral film. With these points equidistant from the plate an antero-posterior film is taken. The patient's head is removed from the plate and a piece of "Perspex", marked as before, is placed in position above the plate at a level corresponding to the distance of the lead markers from it. A flash film is now taken, and the result will give a picture showing the lead markers on the patient's skull with the ventricles and ruled lines. This will give one the distance from the skull to the centre of the ventricular system (Figure II).

As can be seen from the foregoing description, the method can be elaborated to give one the surface anatomy of the ventricular system. It requires no complicated apparatus, and in the examination of difficult patients can be carried out under anæsthesia prior to operation by the use of the "small encephalogram".

Acknowledgements.

This article was based on work done in the neurosurgical and neurological units at Hurstwood Park Hospital, Sussex. I should like to thank Dr. A. J. Galbraith, consultant psychiatrist, who posed the problem of localizing the anterior ends of the ventricles; Mr. G. Johnson, of the electroencephalographic department, who manufactured the "Perspex" grid; and the medical superintendent for permission to quote from hospital cases.

References.

BECK, E., McLARDY, T., and MEYER, A. (1950), "Anatomical Comments on Psychosurgical Procedures", *J. Ment. Sc.*, 96: 157.

DAX, E. C., and RADLEY-SMITH, E. J. (1948), "Operation of Prefrontal Leucotomy", *Brit. J. Surg.*, 36: 74.

FREEMAN, W. (1949), "Recent Techniques in Psychosurgery: Transorbital Leucotomy: Deep Frontal Cut", *Proc. Roy. Soc. Med.* (Supp.), 42: 8.

FREEMAN, W., and WATTS, J. W. (1950), "Psychosurgery in the Treatment of Mental Disorders and Intractable Pain", Second Edition.

McKISSOCK, W. (1948), "Prefrontal Leucotomy", *J. Ment. Sc.*, 94: 834.

McKISSOCK, W. (1949), *Brit. M. J.*, 2: 83.

MEYER, A., and McLARDY, T. (1949), "Clinico-anatomical Studies of Frontal Lobe Function Based on Leucotomy Material", *J. Ment. Sc.*, 95: 403.

POOL, J. L. (1949), "Recent Techniques in Psychosurgery; Topectomy", *Proc. Roy. Soc. Med.* (Supp.), 42: 1.

THE USE OF THE FERN TEST FOR INFERTILITY.

By R. J. R. LEWIS,

Royal Alexandra Hospital for Children, Sydney.

IT is a common observation that the male partner of an infertile marriage goes uninvestigated, even in the more enlightened medical atmosphere of our own day. On the other hand, the woman bravely faces a battery of tests and submits to a variety of treatments, because her desire for a child is strong and represents to her the fulfilment of her destiny.

The use of the test described in this paper will enable the investigator to determine when the male alone is at fault, so that adequate treatment may be directed at him instead of being misdirected at his wife. This test is the fern crystallization test of cervical mucus. It is recommended that it be carried out in conjunction with the Sims test. This is the procedure which has been adopted in the Sterility Clinic at the Women's Hospital, Crown Street, Sydney.

Before the fern crystallization test is discussed, the technique of the Sims test, the equipment necessary and the interpretation of the results obtained will be briefly mentioned.

Sims's test for sperm migration was described by Marion Sims, an American gynæcologist, in 1868. The patients are asked to have intercourse during the presumptive ovulatory phase, and in any case before the rise of the waking temperature from its low to the luteal level. The wife is asked to report six to twenty-four hours after intercourse, no bath or douche being permitted before the visit. A bivalve speculum, wetted, not lubricated, is inserted. The cervix is then thoroughly swabbed with dry cotton-wool swabs on the end of a sponge forceps. The cone-shaped end of a long glass tube three-eighths of an inch in diameter is applied to the mucus at the cervical os, and by suction produced by means of a round rubber bulb at the other end, mucus is withdrawn into the tubing, transferred on to a glass slide and covered with a cover slip. The contents are examined without undue delay on a cold stage under the high-power magnification of the microscope. This is known as the lower Sims test. This slide is then used for carrying out the fern crystallization test.

An upper Sims test is performed also with the use of a sterile metal cannula attached to a syringe. After the specimen has been taken for the lower Sims test, the tip of the cannula is slowly passed along the cervical canal into the cavity of the uterine body. The specimen of the fluid thus obtained is similarly mounted and examined microscopically. This slide is discarded after examination. The presence and relative number of pus cells, red blood cells, epithelial cells and spermatozoa are noted and recorded.

The result of either the higher or the lower Sims test of sperm migration is regarded as "positive" at the hospital

if two or more motile and migratory spermatozoa are found per high-power field of the microscope.

The Fern Test.

The fern test is a test made on the cervical mucus obtained at or just prior to ovulation (calculated by use of the basal body temperature chart, or more roughly, by collecting the mucus between the seventeenth and the twelfth days before the first day of the next menstrual period) for the presence or absence of fern-shaped crystals similar to the specimen shown in the accompanying photomicrograph (Figure I). These are crystals of sodium chloride.

The specimen of cervical mucus put aside from the lower Sims test is used. It is heated over a spirit lamp until the mucus is just dry. The specimen is then examined microscopically for evidence of fern crystallization.

It has been discovered, and the claims have been verified, that cervical mucus undergoes physico-chemical changes during the ovulation period which make it more receptive to spermatozoa. Further, it has been confirmed that these changes in the cervical mucus are due to an increase in œstrogen secretion. Conversely, the use of œstrogens in the treatment of a patient with scanty cervical mucus causes an increase in the secretion of translucent cervical mucus, which has greater fluidity and receptivity to spermatozoa.

The fern-like pattern of the cervical mucus is present in the first half of the menstrual cycle and during the ovulation period. It is absent after ovulation, during pregnancy and after the menopause. Progesterone seems to inhibit its appearance. Fern-like crystallization of the cervical mucus is present at any time of the anovular menstrual cycles with normal œstrogen level.

Fern-like crystallization is closely related to the receptivity of the cervical mucus to spermatozoa. As the crystallization loses its characteristic features, the receptivity of the mucus diminishes. When the crystallization is absent, the mucus, as a rule, is hostile to spermatozoa.

The Material Studied.

The present series of 77 tests was carried out on patients attending the Sterility Clinic of the Women's Hospital, Crown Street, in an attempt to evaluate the fern test and verify the results obtained by A. Compos da Paz (1953).

The results of the fern tests were correlated with those of Sims's tests performed at the same time, and with the most recent seminal analysis of the husband.

The Results.

The results are best appreciated if they are examined as set out in Table I.

TABLE I.

Result of Fern Test.	Result of Sims Test.	Number of Sims Tests.	Result of Sperm Analysis.
Negative.	Negative.	18 } 20	Majority fertile.
Negative.	Positive.	2 }	Both fertile.
Positive.	Negative.	30 } 57	All subfertile.
Positive.	Positive.	27 }	All fertile.

Discussion.

As a rule the absence of fern formation in dried cervical mucus means that the mucus is hostile to sperm invasion. The only exceptions in the present series were when the sperm count was assessed as "very fertile". Apparently, in a very fertile specimen of seminal fluid the constituent sperms can invade a mucus of poor quality. On the other hand, the presence of fern formation does not mean that mucus will necessarily be invaded by spermatozoa assessed as subfertile, because the penetrability of the spermatozoa is at fault in that particular infertile marriage. Treatment should be directed at the husband when the result of the fern test is positive and no sperm invasion takes place.

Conclusions.

The following conclusions appear to be valid.

1. If the fern test result is positive and the mucus is normal, then the failure of sperms to invade it (as shown by Sims's test) is due to the male elements. The fault is in the sperms and not in the mucus.

2. If the fern test result is negative, good sperms may still invade it, but poor ones will fail to do so.

Summary.

The concise value of the test is as follows:

1. If the result of the fern test is positive and the sperms fail to invade the cervical mucus, then the defect in sperm migration is all on the male side, and treatment should be directed at the husband and not at his wife.

2. If the fern test result is negative and the sperms fail to invade the cervical mucus, then the defect in sperm migration, provided analysis of the seminal fluid gives normal results, is all on the female side, and treatment should be directed at the wife and not at her husband.

Acknowledgements.

My thanks are due to Dr. Alan Grant, of the Women's Hospital, Crown Street, who suggested the nature of this research and made many helpful suggestions; to Sister N. Johnson, Sister M. Mitchell and Miss P. Lamey, of the Sterility Clinic, for their assistance with records and typing, and to Mr. N. Frost, of the Pathology Department, for the photomicrograph.

References.

COMPOS DA PAZ, A. (1953), "The Crystallization Test as a Guide to the Treatment of Cervical Hostility", *Am. J. Fertil. & Steril.*, 4:137.

BERGMAN, P. (1953), "Spermigration and Cyclic Changes in Cervical Mucus", *Am. J. Fertil. & Steril.*, 4:183.

WEISMAN, A. (1941), "Spermatozoa and Sterility", Hoeber, 135.

Reports of Cases.

AN UNUSUAL CAUSE OF INTESTINAL OBSTRUCTION.

By C. W. R. PRICE,
Perth.

A POSSIBLY unique complication of the use of the abortifacient Gräfenberg ring was recently treated in the wards of Mr. B. W. Nairn's clinic at the Royal Perth Hospital.

A married parous woman in her thirties, presenting with an acute abdominal condition, had an abdominal X-ray film taken on suspicion of intestinal obstruction. The film was not helpful in this regard, but revealed two coiled-wire ring shadows in the pelvis (Figure I). That these shadows

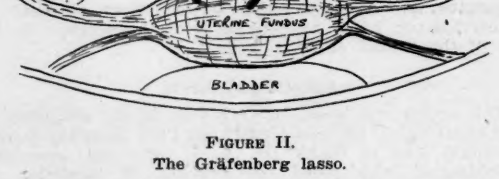


FIGURE II.
The Gräfenberg lasso.

were due to the Gräfenberg device was confirmed by the patient, who said that her doctor had inserted the second ring because he thought that the first had fallen out. The

high position of one of the rings in the radiograph led to the belief that it had in some way become extrauterine, and this was confirmed at the (unfortunately delayed) laparotomy. The ring had migrated for about three-quarters of its circumference through the uterine fundus, and thus presented as a sort of silver wire lasso in the peritoneal cavity (Figure II). A coil of ileum three feet long had passed through the loop, with consequent strangulation and gangrene. The ring was pulled out of the uterus only by the exercise of considerable force, and slow recovery with temporary external fistula formation followed gut resection.

It seems pertinent to add that, while this patient was still in hospital, the writer had the opportunity of seeing a typical leaking ectopic gestation in a patient who had been using a Gräfenberg ring for several months.

ADRENOGENITAL SYNDROME: REPORTS OF TWO ILLUSTRATIVE CASES.

By LESLIE P. WAIT,

Physician to In-Patients, Royal Children's Hospital, Melbourne.

THE adrenogenital syndrome in children, though not a common occurrence, is certainly not rare. The increased androgenic activity characteristic of this condition is more commonly due to symmetrical hyperplasia of the adrenal glands than to elaboration of hormones by a defined tumour of the adrenal cortex. The clinical histories of two patients exhibiting this syndrome, in both of whom an adrenal tumour was demonstrated radiologically and its presence confirmed by laparotomy, are therefore worthy of presentation.

Case I.

In April, 1945, a girl, aged six years and four months, was brought to the Royal Children's Hospital, Melbourne, having suffered "turns" for the previous four years. These episodes were characterized by salivation, throwing back of the head, and, on some occasions, twitching of the limbs. The incidents usually occurred at night, and never involved loss of consciousness or loss of sphincter control.

In the course of routine physical examination it was observed that the girl had a profuse growth of pubic hair, which according to the mother's statement had been present since the early months of the child's life; inquiry elicited the information that there had never been any vaginal bleeding. The external genitalia, particularly the clitoris, were unusually well developed for the patient's age; there was no enlargement of the breasts, but the presence of some axillary hair was noted. A tumour was palpable in the region of the right kidney.

Radiographic examination revealed the shadow of an irregularly calcified mass, situated just above the right kidney. In an excretion pyelogram the upper calyx of the right kidney was not visible, and the impression gained was that it was obliterated by the compression of an adrenal tumour. In a radiograph taken after perirenal insufflation of air the right kidney was seen to be of normal size. A circular shadow, in the field of which were calcium deposits, lay above the right kidney; the shadow was clearly demonstrated and confidently interpreted by Dr. Colin Macdonald as that of an adrenal tumour. X-ray examination of the skull showed the pituitary fossa to be "within normal limits".

The urinary 17-ketosteroid excretion rate was estimated as 15 milligrammes per twenty-four-hour specimen of urine. Negative findings attended the application of the Mantoux, Casoni, and hydatid complement fixation tests.

The surgical procedure indicated by the results of clinical, radiological and laboratory investigation was undertaken by Mr. John Begg, who removed an encapsulated adrenal tumour without difficulty and with minimal embarrassment from hæmorrhage. Post-operative convalescence was uneventful.

Dr. Reginald Webster's report on the tumour was as follows:

> The tumour is composed of three lobules, two of which are very much degenerated. Calcium deposition is extensive, and at one pole there is a spicule of ossification. The microscopic section shows excessive vascularity, much degeneration and necrosis, and calcium "sand". Although there are fields in which the arrangement of the zona fasciculata of the adrenal is preserved, there are many in which the cells are aberrant, and exhibit mitoses. The difficulty in microscopic diagnosis lies in the significance to be attached to the aberrant cells as indicative of malignant metaplasia or degenerative change. It is unusual for a benign tumour to exhibit so much hæmorrhage and necrosis and these features, considered with the abnormal morphology and evidence of proliferation displayed by many cells, determine the decision of malignancy.

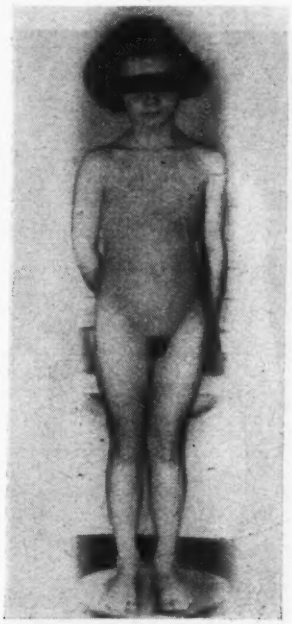


FIGURE I.
Case I. Patient, aged six years and four months; abundant growth of pubic hair.

The patient has been examined at intervals during the eight years which have elapsed since the removal of her adrenal tumour; one month after the operation the urinary 17-ketosteroid excretion was determined as 0·83 milligramme per twenty-four-hour specimen of urine. Further estimations have been made during the eight-year period, and the highest figure recorded has been one milligramme per twenty-four-hour specimen of urine. At the age of twelve years menstruation commenced, and this function was maintained regularly and normally during the two years which intervened between its onset and the girl's last clinical examination. Her mother considers that she has developed normally, and it is interesting to note that there has been no recurrence of the "turns" for which advice was originally sought.

It is to be observed that although the urinary 17-ketosteroid excretion was definitely above the normal range, it was at no time very high, a fact which may be referable to the extensive degeneration in the tumour. When last examined in 1953, the subject of this communication

appeared to be a perfectly normal and well developed young woman.

Case II.

The second patient, a girl, aged eight years and four months, came originally under the observation of Dr. G. A. Spillane, whom the child's mother consulted with reference to what she described as a "cheesy" discharge; the discharge appeared between the *labia minora* in the region of the clitoris. Impressed by the genital hypertrophy and growth of pubic hair Dr. Spillane strongly suspected an endocrine dyscrasia, and considered the possibility of an underlying neoplasm. In reply to questioning, the mother said that she had noticed the growth of pubic hair during the previous eight months, but that she was not unduly concerned as she considered it to be due to early onset of puberty. The girl displayed no other signs or symptoms and had always enjoyed good health. Her mother and father are both above average in height and physical development; they have one other daughter, aged twelve years, in whom her mother has noted breast development, but no growth of pubic hair.

FIGURE III.
Case I. Patient, aged fourteen years.

The patient presented as a tall girl, four feet eight inches in height, of masculine type of physique and striking lack of breast development. Her voice was deep and she looked older than her years. The external genitalia exhibited conspicuous over-development, the *labia majora* and *labia minora* being very prominent. The clitoris was large, and the accumulation of smegma which aroused the mother's concern initially was found to be due to the presence of preputial adhesions. Pubic hair was abundant, but associated axillary hair was less exuberant. No tumour could be palpated in the abdomen, even with the assistance afforded by anæsthesia. In other respects the physical examination revealed no abnormality. The findings on clinical examination suggested adrenal overactivity, and the implied possibility of a cortical adrenal tumour.

The patient was admitted to the Royal Children's Hospital, Melbourne, for further investigation and treatment. Estimations of urinary 17-ketosteroid excretion on two occasions resulted in figures of 120 and 136 milligrammes per twenty-four-hour specimen of urine respectively. No abnormal shadows could be discerned in a radiograph of the abdomen. With the aid of tomography an excretion pyelogram showed that the left kidney was displaced downwards by a large rounded tissue mass, and that its upper calyces were distorted as if by external pressure. The renal system on the right side showed no departure from the normal.

The indicated surgical procedure was carried out by Mr. J. G. Whitaker. After division of the diaphragm, reached by transthoracic approach, a large, smooth, encapsulated mass, 7·5 centimetes in diameter and retroperitoneal in situation, was delivered through the incision in the diaphragm, and removed with comparative ease. A few fragments of orange-coloured tissue were located and considered to be remnants of suprarenal tissue. The post-operative course was uneventful.

FIGURE IV.
Case II. Patient, aged eight years and four months; virilism and masculine physique.

Estimation of the urinary 17-ketosteroid excretion on the sixth day after the operation showed a dramatic fall to 4·2 milligrammes per twenty-four-hour specimen of urine. Dr. Alan Williams furnished the following report on the histological features of the tumour:

> The tumour cells are in some microscopic fields arranged in cords which bear a resemblance to those of suprarenal tissue. The cells are cuboidal and contain large deeply staining nuclei, with prominent nucleoli. The cytoplasm stains unevenly and exhibits small, irregular, basophil granules. The tumour cells vary in size, as do their nuclei; some cells contain two nuclei. The neoplasm appears to be an adenoma of the suprarenal cortex.

The patient was again examined nine months after the operation, and on that occasion the mother reported that she had observed a modification in the child's personality towards feminism, indicated by softening of the voice and a notably more gentle manner. At this time signs of the advent of puberty were not wanting.

Comment.

In contrast with the relatively low figures obtained by assay of the urine of the first patient for 17-ketosteroids, those obtained by identical procedures applied to the urine of the second patient were extremely high, and the striking difference in the extent to which androgenic hormones were elaborated by the respective neoplasms would seem to be explained by the degenerated and necrotic character of the adrenal tumour in the first instance, and by the lack of such features in the second.

A concise review of the problems posed by tumours of the adrenal gland appeared in a "Current Comment" in this journal on September 11, 1954; reference was made to a comprehensive article by G. F. Cahill (1954). In this account due cognizance is taken of virilizing cortical tumours and their predilection for younger subjects, not excluding children. A statement of particular interest is that administration of cortisone may serve to differentiate bilateral adrenal hyperplasia from adrenal tumour, in situations in which an adrenal tumour is not so readily demonstrable as in the two present cases. Cortisone is said to cause a reduction of the 17-ketosteroid output when virilism is referable to bilateral hyperplasia of the adrenal glands, but to have no such effect when the pathological basis is an adrenal neoplasm.

Acknowledgements.

I wish to acknowledge my thanks to Dr. Reginald Webster for his help and advice in the preparation of these reports and to Mr. Murphy, of the Photographic Department, Royal Children's Hospital, Melbourne, for preparing the photographs. Dr. H. Hiller was largely responsible for the excellent radiological demonstration of the adrenal tumour in the second case.

Reference.

CAHILL, G. F. (1954), "Adrenalectomy for Adrenal Tumours", *J. Urol.*, 71: 123.

PATENT DUCTUS ARTERIOSUS IN INFANCY WITH GROSS CARDIAC EMBARRASSMENT.

By MOSTYN L. POWELL,
Melbourne.

IN July, 1953, a small, under-nourished, four months old female baby appeared in the wards of the Royal Children's Hospital, Melbourne, with a diagnosis of bronchopneumonia and congenital heart disease. There was a story of great feeding difficulty, dyspnœa, repeated respiratory tract infections and marked failure to thrive. Some of the difficulty of feeding was apparently due to the dyspnœa. There was no story of pregnancy illness in the mother.

On examination of the baby the following were found: obvious pallor (but with a hæmoglobin value of 88%), severe dyspnœa, a protuberant precordium, considerable chest retraction during inspiration, and a loud, harsh, systolic murmur heard above extensive rales and rhonchi diffusely scattered over both lung fields. The X-ray film showed a very large heart with a convex left upper border, and what could be seen of the lung fields outside the cardiac border appeared congested. The femoral pulses were noted to be present.

The clinical impression at this stage was that a severe congenital heart lesion was present, probably a large septal defect with an extensive respiratory tract infection, for which antibiotic therapy was commenced. After some days improvement in the general condition occurred, the lung signs cleared and further attention was directed towards the heart.

It was now possible to establish the fact that the major bruit was harsh, long systolic, and definitely maximal high up in the left side of the chest and well conducted out towards the left shoulder. Along the left border of the sternum about the third left intercostal space was a definite pulmonary diastolic murmur, and further out towards the apex there was a systolic and mid-diastolic bruit which produced a triple rhythm reminiscent of the mitral regurgitant bruits of early rheumatism. The second sound was loud, slapping and split. There was considerable precordial pulsation from the tumultuous heart action, but it was impossible to say whether from right or left ventricular predominance. The pulses were noted to be most forcible and suggested a high pulse pressure. An electrocardiogram showed no axis deviation or chamber predominance. It was the character of the high basal murmur, although it was in no sense continuous, which first suggested the possibility of a patent ductus, and though the other bruits were confusing, they were possibly explicable on the grounds of functional regurgitant bruits of the pulmonary and mitral valves due to the severe cardiac embarrassment.

The intramuscular injection of paraldehyde was used at this stage to obtain more accurate auscultation and a blood pressure. The latter was found to be 120 millimetres of mercury, systolic, and 0 to 5 millimetres, diastolic. (It is, of course, easy to produce a diastolic pressure of 0 millimetre of mercury by pressure with the stethoscope bell, but there is little doubt that a huge pulse pressure was present.) The next few weeks were occupied in obtaining control of the respiratory tract infection (which, in retrospect, may well have had a cardiac basis), and many hours of thought went into the possibility that the baby might have a patent ductus. It was considered that angiocardiography would not help the diagnosis and that help from cardiac catheterization was doubtful. The baby's weight during these weeks remained stationary (see Figure II).

Finally, it was decided that the baby's only chance lay in the presence of the essentially curable lesion, the patent ductus. Dr. Russell Howard carried out an exploratory operation and found a patent *ductus arteriosus* six millimetres in external diameter, the aorta above and below it being 11 millimetres in diameter. After operation all murmurs vanished, except a short, faint, systolic bruit in the pulmonary area. It was quite fantastic to see how quickly the dyspnœa, the pallor, the chest retraction and the feeding difficulty vanished in this baby. The weight immediately started to rise and there has been progressive increase. After six months' post-operative observation of this baby there has been no further respiratory tract "infection" and the general improvement has been maintained. So far the cardiac contour in the X-ray film has shown but little improvement, which suggests that the heart was near the limit of its dilatation. It is hoped that in due course some return to a normal cardio-thoracic ratio will eventuate.

This case was a new and salutary experience. There had been previously at the hospital infants aged under twelve months with a patent ductus, but they had had characteristic continuous murmurs, were not particularly embarrassed by the lesion and were operated upon in routine fashion. The case quoted above was a prototype for a group of eight more cases which followed in steady sequence over the next few months.

Characteristics of the Condition.

These cases followed in general a fairly characteristic pattern, the various facets of which will be described.

Sex.

All the patients were females, with one exception.

Age.

The ages were as follows: four weeks, seven months, eighteen months, thirty-three months, three months, seven months, five weeks, and eight months.

Maternal Rubella.

The occurrence of maternal rubella was established in one case only, in spite of intensive questioning.

Symptoms.

All the children showed pronounced failure to thrive. The child aged thirty-three months weighed 19 pounds,

and the baby aged eighteen months weighed 18 pounds. In the smaller infants there was always a feeding difficulty, reluctance to take feeding, gagging, regurgitation *et cetera*, which seems to have been due to the great size of the heart. Repeated respiratory tract infections were almost invariable, and again one wonders whether cardiac embarrassment had something to do with this.

The Signs.

All the subjects were small, underweight infants. A non-anæmic pallor probably due to poor cardiac output was a common finding. This pallor vanishes post-operatively.

The bruits in three of the cases were as described in more detail in the foregoing case. In the remainder the pulmonary diastolic bruit was not heard, and in two of the cases the apical systolic bruit was louder than the basal bruit, which was a most confusing finding. In the one male subject, a baby aged three months, the bruit, high up in the left side of the chest though not truly continuous, was really suggestive of a ductus bruit.

The blood pressures were all estimated under intramuscular paraldehyde sedation, and all systolic pressures were above 100 millimetres of mercury, the lowest being 105 millimetres, the highest 130 millimetres. The diastolic pressures were low; three were recorded as 0 millimetre of mercury, one as 10 millimetres, three as 40 millimetres, and one as 50 millimetres.

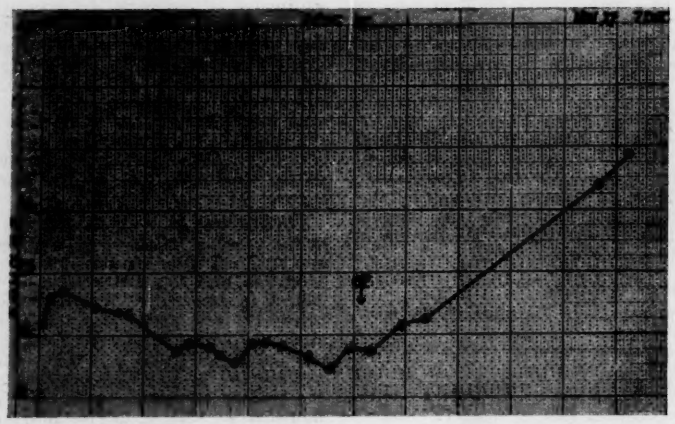


FIGURE II.
The weight chart of the same patient as in Figure I, showing the post-operative improvement.

All electrocardiograms were normal—that is, there was no axis deviation or chamber preponderance. It could be argued that in infants of this age this may represent some left-sided preponderance compared with the normal.

X-ray cardiac contours were not particularly diagnostic; all hearts were large, reaching a 75% cardio-thoracic index at times, with very full left borders and congested lung fields. The contours were indistinguishable from those found in many of the severe congenital anomalies, such as the large septal defects.

Size of Ductus.

At operation the ductus in all cases except one was very large and approximated, and in one case it was greater than, the size of the proximal and distal sections of the aorta, the actual figures for the external diameter being six millimetres, six millimetres, nine millimetres, eight millimetres, ten millimetres, seven millimetres, ten millimetres, three millimetres and twelve millimetres. In the subject with the twelve-millimetre ductus, the proximal and distal sections of the aorta were actually smaller, being 10 and 11 millimetres in diameter respectively.

The Bruits after Operation.

In six of the cases after operation, either no bruits were audible at all or a faint pulmonary systolic bruit was heard. Indeed, the precordial silence following operation was fascinating, and of course gave considerable satisfaction. In two of the cases there was a residual short, sharp, parasternal bruit, which may indicate a coincident septal defect, and it is rather interesting that in both those cases there has been difficulty in producing satisfactory weight gain since operation. In one of the cases after some four months a very faint continuous bruit was heard in the ductus area; this may indicate recanalization, a point which will be discussed later.

Post-Operative X-Ray Cardiac Contours.

In five of the cases there has been a reduction in the size of the heart and in pulmonary congestion since operation. Two of the subjects, in both of whom great cardiac enlargement was present, have shown practically no change in cardiac contour over the space of some months. It is considered that their hearts were near the limit of their capacity at the time of operation. The contours of all these hearts are being watched at three-monthly intervals, and in all but the two cases mentioned above progressive reduction in cardio-thoracic index is expected.

Post-Operative Weight Gain.

Failure to thrive was a prominent symptom in all these cases, and one of the most gratifying features in seven of them was the immediate gain in weight; a characteristic chart is shown in the diagram (Figure II). The improvement in appearance with the loss of pallor, the increased muscle tone, and complete subsidence of chest retraction and feeding difficulty have been pronounced. The respiratory tract infections which had been such a constant feature were notably diminished, and one wonders how far left ventricular embarrassment was responsible for this symptom. The two children who have been rather slow to show improvement are the two with residual bruits suggesting ventricular septal defect or auricular septal defect.

Discussion.

This group of cases has presented an unusual facet of the influence of a huge ductus shunt in infancy. In Maude Abbott's series of 92 deaths from uncomplicated patent *ductus arteriosus*, 20 of the patients died in the first twelve months of life. In the post-mortem records at the Royal Children's Hospital not one such case has been recorded; but it would appear that in some of the cases described above the children were reaching the limit of their cardiac reserve. The huge size of the ductus in these cases must have produced the early cardiac embarrassment and subsequent cardiac dilatation which in turn were responsible for the unusual group of murmurs. It seemed extraordinary that we should have such a stream of these small infants, a fact which raised the thought of some epidemic during the gestation period; but the occurrence of rubella in the mother's pregnancy was proven in one case only. The actual months at which these babies were in the second month of gestation did not conform to any particular epidemic as shown by the public health records.

The diagnosis was made on clinical grounds and was based on the following five main features: (i) the long systolic murmur high in the left side of the chest, conducted out to the left shoulder, and accompanied by a loud, slapping and usually split second sound; (ii) a large heart, usually, but not always, with a full pulmonary segment; (iii) congested lung fields; (iv) the presence of

a high pulse pressure, with the systolic pressure always above 100 millimetres of mercury under sedation; (v) a normal electrocardiogram.

The use of the cardiac catheter, unless it actually passes through the ductus, will be accompanied by fallacies and considerable technical difficulties. The presence of pulmonary regurgitation and a coincident septal defect could make the oximetry difficult of interpretation. One may well feel diffident of denying the right of exploratory operation to a non-thriving infant with a large embarrassed heart bearing the suggestive bruits indicated, because of conflicting catheter findings.

The operations on these infants, all of which in this series were performed by Dr. Russell Howard, may present considerable difficulty, owing to the large size of the ductus. It is in just these cases that section of the ductus would be preferable to ligation; but the technical difficulties are great, and in all the cases the ducts were ligated. One of the subjects since operation has developed a faint continuous murmur (far more classical than the original murmur), and will require further operation later.

This group of cases is presented to draw attention to the fact that a patent *ductus arteriosus* can exert its malign influence upon cardiac hæmodynamics at a very early age, and that the diagnosis is rendered difficult by a confusing, atypical group of murmurs. It need not, of course, be stressed that in spite of these difficulties the diagnosis must be made or be suspected.

Addendum.

Since the above article was written, seven more cases of similar type have appeared. One patient, aged two and a half years, had been seen at the hospital at the age of six months, with pulmonary collapse and a congenital heart lesion, the significance of which had understandably been missed. Recalled from a remote country town by the vigilance of Dr. Ron O'Reilly working in Dr. Howard Williams's clinic, this child, now thin, dyspnœic, anæmic and in a state of chronic cardiac failure, had a ductus 14 millimetres in external diameter.

Reviews.

Radiology for Medical Students. By Fred Jenner Hodges, M.D., Isadore Lampe, M.D., and John Floyd Holt, M.D.; Second Edition; 1954. Chicago: The Year Book Publishers, Incorporated. 8" × 6", pp. 440, with 106 illustrations. Price: $8.00.

THE first edition of this work appeared in 1947 and was reviewed in these columns. Much of the work has been rewritten and further plates have been added. An interesting introduction describes briefly the advances in radiology since Röntgen's discovery in 1895. This is followed by a brief description of the necessary apparatus with general views on radiology in various abnormal conditions and suggestions as to handling of cases and recording of findings. Short but adequate descriptions of "positioning" with notes on the various features to be looked for are clearly set out. Technical details of exposure are not given. The illustrations are of the highest quality and footnotes describe the lesions shown in the films. The section on radiotherapy contains sufficient detail for the student and the many conditions in which therapy is of value are described. Altogether this is an admirable little work and should be of great value to the student and to the occasional worker in radiology.

Disorders of the Blood: Diagnosis, Pathology, Treatment, Technique. By Sir Lionel E. H. Whitby, C.V.O., M.C., M.A., M.D. (Cantab.), F.R.C.P. (Lond.), D.P.H., and C. J. C. Britton, M.D. (New Zealand), D.P.H.; Seventh Edition; 1953. London: J. and A. Churchill, Limited. 9½" × 6¼", pp. 870, with many illustrations, some in colour. Price: 63s.

SINCE its appearance in 1935, this book has taken pride of place among British text-books of hæmatology. It was greatly enlarged and improved in its sixth edition, which appeared in 1950. Now in its seventh edition, this book has been further revised and enlarged. New material has been added to the chapters dealing with hæmatopoietic metabolism, therapeutics, coagulation and the purpuric and hæmorrhagic diseases. This has been necessitated by the great activity in research into these subjects during the past three years. For similar reasons a new chapter on cytochemistry and biochemistry has been added. As the authors write in their new preface, the preparation of a new edition of a text-book of hæmatology is now a tremendous task since certain sections of the subject, such as coagulation and immunohæmatology, have become specialist fields in themselves. It is awful, in the true sense of that much misused word, to reflect, for instance, how extensive and how intricate the subject of the Rh factor has become; yet this is only a part of immunohæmatology, which is in turn a relatively minor section of hæmatology. All that can be done, as Whitby and Britton point out, is to aim at a "reasonable presentation" of the subject, and in this they have been on the whole most successful. This book is amazingly complete and up to date. One criticism that might be made is, that while the book has grown amazingly in its sixth and seventh editions, it has not been well pruned during that growth. Some of the chapters need rewriting completely. For instance, the name "Idiopathic Hypochromic Anæmia" is retained as the title of a chapter, and most authorities agree nowadays that the term "idiopathic hypochromic anæmia" is a misnomer and should be relegated to the history of medicine. The cause of the iron deficiency can almost always be found, if it is looked for.

The text of this new edition has been increased by 87 pages, largely by new methods in technique, and eight new plates have been added. It retains its place as the best British text-book on the subject.

Please, Doctor: The Intimate Problems of Women. By Henry B. Safford, M.D.; 1954. London: W. H. Allen. Sydney: Walter Standish and Sons. 8½" × 5", pp. 200. Price: 15s.

THIS work discusses the intimate problems that any woman may be confronted with during and after her reproductive life. It consists of twenty-nine case histories which cover all kinds of gynæcological and obstetrical subjects, such as the abnormalities of menstruation, pseudocyesis, abortion, tumours both innocent and malignant, and the menopause, to instance a few, all of which are written in a conversational and easily read style.

The book is one that any intelligent woman could read with advantage; perhaps its main purpose is summed up in the foreword where the author states: "If a perusal of its contents serves to make even one woman symptom-conscious in the face of impending disaster, then the author will feel richly repaid for any effort on his part." On the other hand, however, some readers of this and similar works can be made too symptom-conscious by them. Therefore, it is essential that doctors should recommend them only to the most discerning of their patients. The danger of "a little learning" is always real in medical matters; nevertheless, the knowledge gained from such a well-intentioned book as this is far preferable to that derived from drawing-room gossip.

In some of the cases discussed, the part played by the woman's spouse is featured. This enables husbands to understand more fully the complexities that can confront the wives and shows how the problems associated with the various disorders should be shared by the two partners.

Surgery of the Caecum and Colon. By Stanley Aylett, M.B.E., M.B., B.S., B.Sc., F.R.C.S.; 1954. Edinburgh and London: E. and S. Livingstone, Limited. 10" × 7", pp. 302, with 142 illustrations. Price: 45s.

STANLEY AYLETT needs no introduction to Australian surgeons who have travelled abroad since the war. His work at the Gordon Hospital has attracted the attention of medical visitors in London. This book, therefore, will be of interest to many.

The book has been published by E. and S. Livingstone, Limited, and upholds the high standard that has been set by them. The print is large and the many paragraphs and headings, combined with some excellent illustrations, make the work an easy one to read. It is a book mainly concerned with tumours of the colon, ulcerative colitis and diverticulitis.

It is easy to be critical of any book, and this one affords no exception. The important physiology of the large bowel is given a single page, whilst sigmoidoscopy is dealt with in ten lines. A rectal examination with the left index finger places the right-handed examiner at a disadvantage. Practically no mention is made of the significance of peritoneal spread in the prognosis of large bowel tumours, and yet

XUM

many believe that prognosis is as much linked with that as with lymphatic spread.

It is of interest to note that Aylett does not recommend a preliminary colostomy or caecostomy for non-obstructing carcinoma, except when the tumour is situated at the recto-sigmoid junction, in which circumstance resection is preceded by a transverse colostomy. He recommends the cumbersome side-to-side or end-to-side anastomosis after a right hemicolectomy, and, when performing a left hemicolectomy for a carcinoma of the descending colon, he resects the upper half of the rectum, which appears to be unnecessary.

He has his own procedure for ulcerative colitis, and, on the whole, favours methods designed to preserve the anal sphincters. In the chapter dealing with the surgery of diverticulitis of the colon, he describes the defunctioning transverse colostomy.

The pre-operative and post-operative treatment is well described, and the surgical manœuvres are beautifully illustrated. Whether or not the reader will agree with the wisdom or necessity of some of the procedures recommended is debatable.

The book should certainly find its way into the library of all interested in large bowel surgery, and will prove useful to those preparing for higher degrees in surgery.

Text-Book of Ophthalmology. By Stewart Duke-Elder, K.C.V.O., M.A., LL.D., D.Sc. (St. And.), Ph.D. (London), M.D., F.R.C.S., Hon.D.Sc. (Northwestern), M.D. (Dublin), D.M. (Utrecht, Strasbourg), F.R.C.S. (Edin.), F.A.C.S.; 1954. Volume VII: Summary of Systemic Ophthalmology. General Index. London: Henry Kimpton. 10" x 7", pp. 244. Price: 25s.

THE concluding volume of Sir Stewart Duke-Elder's great "Text-Book of Ophthalmology" is devoted to a general index. He states in the introduction, or rather postscript, as he styles it, that it was his original intention to complete the text-book with a final volume on operative surgery. Several considerations, however, have deterred him from this project. In the first place, since the Second World War a whole spate of works on ophthalmic surgery has appeared, and he suggests that "to add to these accumulated riches were mere miserliness". Moreover, in the preceding six volumes, the philosophy of ophthalmic surgery has already been dealt with in each particular section, leaving, if repetition would be avoided, only descriptions of "the carpentry of techniques—a somewhat uninspiring prospect both for writer and for reader". He expresses the wise view that if more writing is to be done, it would be better to go back to the first volume, now twenty-five years old, and to seek to bring it up to date. Volume VII is more than a simple index. A general index is, indeed, provided, but in addition there is a summary of systemic ophthalmology referring the reader for details to appropriate parts of the text-book. It covers the ophthalmological implications of systemic diseases, which are divided into four categories—infective systemic diseases, non-infective systemic diseases and diseases of unknown origin, diseases of the central nervous system (infective and non-infective) and diseases of the skin. This index volume will be necessary to all readers of the text-book as a whole. It brings to a conclusion a brilliant work that is perhaps unique in the whole field of medical writing.

Cancer: Race and Geography: Some Etiological, Environmental, Ethnological, Epidemiological, and Statistical Aspects in Caucasoids, Mongoloids, Negroids, and Mexicans. By Paul E. Steiner, Ph.D., M.D.; 1954. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 376, with 73 text figures. Price: 53s. 9d.

THIS book is evidence of a tendency now to return from the study of cancer in experimental animals to the study of the epidemiology of the disease in man. The author has taken advantage of the presence of a number of different races in the Los Angeles, California, area to compare the frequencies of the cancers of different sites among them. Since the same pathologists will have been responsible for the autopsies, a reasonable comparison between Caucasoids, Negroids and Mongoloids may be expected. The chief difficulty here is that populations at risk cannot be determined, but by various devices the author has secured comparisons which probably are fair. His aim to compare the Negro in America with the Negro in Africa is thwarted by the absence of representative studies in Africa, and the same applies to the Mexicans.

Interesting tumours from the point of view of geography and race include the naso-pharyngeal cancer of the Chinese, which has a high incidence even after migration to Cuba; the high rates for cancer of the stomach in Chinese in California; the high rates for lung cancers in Mexican females in California perhaps due to household smoke. The importance of factors in early life causing cancer of the liver (malnutrition) or preventing cancer of the penis (circumcision) is discussed. The author concludes that many reputedly racial differences are really environmental. The book will serve as a valuable base for comparison with the autopsy records of other hospital populations.

Books Received.

[*The mention of a book in this column does not imply that no review will appear in a subsequent issue.*]

"Amputations", by Leon Gillis, M.B.E., M.B., B.Ch. (Witwatersrand), M.Ch. Orth. (Liverpool), D.L.O. (London), F.R.C.S. (England), F.R.C.S. (Edinburgh), Hon. F.I.C.S. (Geneva); 1954. London: William Heinemann (Medical Books), Limited. 10" x 7½", pp. 434, with 342 illustrations. Price: 84s.

Deals with every aspect of the subject—historical and practical—and embodies lessons learned in two world wars.

"Any Questions?: A Selection of Questions and Answers Published in the British Medical Journal"; Third Series; 1954. London: British Medical Association. 7½" x 5", pp. 242. Price: 7s. 6d.

This volume is well known. Each answer has been chosen for its permanent worth and practical value to the practitioner.

"Tumours of Lymphoid Tissue", by George Lumb, M.D., with a foreword by Stanford Cade, K.B.E., C.B., D.Sc., F.R.C.S., M.R.C.P., F.F.R.; 1954. Edinburgh and London: E. and S. Livingstone, Limited. 10" x 7", pp. 212, with 195 illustrations. Price: 37s. 6d.

The author of this monograph is reader in pathology at the Westminster Medical School, London University.

"Tuberculosis in Ireland: Report of the National Tuberculosis Survey (1950-53)"; director, James Deeny, M.D.; 1954. Dublin: The Medical Research Council of Ireland. 10" x 6½", pp. 302, with 45 illustrations.

The work is presented in eight sections, each complete in itself, followed by a section devoted to conclusions and recommendations and one of appendices.

"Antibiotism and Immunity Medicine of To-Morrow", by Alexander Komis, M.D.; 1954. Bristol: John Wright and Sons, Limited. 8½" x 6", pp. 72. Price: 16s. 6d.

Progress consequent on the discovery of the antibiotics is, the author concludes, none other than a return to the empiricism of the past century and that which reigned in medicine before the time of Hippocrates.

"Techniques in Clinical Chemistry: A Handbook for Medical Laboratory Technicians", by Frederick N. Bullock, F.I.M.L.T., F.R.M.S., F.C.S.; 1954. Bristol: John Wright and Sons, Limited. 9" x 6", pp. 180, with seven text figures. Price: 16s. 6d.

The book is intended to supplement, rather than replace, more exhaustive manuals.

"Growth and Development of Children", by Ernest H. Watson, M.D., and George H. Lowrey, M.D.; Second Edition; 1954. Chicago: The Year Book Publishers, Incorporated. 9" x 6", pp. 296, with 69 illustrations. Price: $7.00.

The first edition was published in 1951.

"Childbirth: Theory and Practical Training", by Marjorie F. Chappell, D.N. (London), S.R.N., C.S.P., S.C.M., H.V. Cert., with a foreword by C. Keith Vartan, F.R.C.S., F.R.C.O.G.; 1954. Edinburgh and London: E. and S. Livingstone, Limited. 7½" x 5", pp. 136, with 35 illustrations. Price: 7s. 6d.

Intended to present a planned training course for childbirth.

The Medical Journal of Australia

SATURDAY, JANUARY 22, 1955.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE IDEAL EXERCISE.

IT is generally assumed that for an exercise to confer the greatest benefit on the body, especially the youthful body, it should demand strength and skill and should include speed. The various forms of exercise differ widely in this respect. In dumb-bells and "Sandow" apparatus, when used solus, strength only is put into operation; weight-lifting needs some knack as well as strength, but it is difficult to find in billiards and rifle shooting any other requirement than skill. The muscular movements demanded by bowls and croquet are of a low order of magnitude; the great advantage these have over billiards is that they take place in the open air. In hunting and horse-racing more muscular energy is expended by the rider than is often realized. In the great games of football, tennis, lacrosse, cricket and baseball we see a fine blend of the three outstanding qualities, and to this blend is due in large measure their beneficent operations on the human body. It must be conceded, however, that other qualities play a part, perhaps just as important. Let us look at them in succession. First, competition stimulates the participants and removes any element of perfunctoriness in the conduct of the game; it also begets pleasureable excitement, and this by hormonal and nervous cooperation increases circulatory efficiency and the nutrition of the muscles. Second, team work has a significance moral and social rather than physiological, but of its importance and value there can be no doubt. Discipline, respect for authority (often self-imposed authority), recognition of the necessity of concerted action and often some self-sacrifice, all react for good on the moral development, especially of young people. Team work is lamentably absent from golf and some games of skill, but is strong in football, cricket, baseball, rowing eights and several other sports. A study of the conquest of Mount Everest shows team work in one of its noblest manifestations. That Sir John Hunt did not actually reach the summit of the mountain does not in the least detract from the honour he has won in this memorable climb. It may in general be recommended that team work should be prescribed for boys and girls of school age rather than solitary exercises of skill. To the Anglo-Saxon and to English-speaking peoples may be ascribed the emphasis placed on team work in games necessitating strength, skill and speed. Until recently Teutonic athletes have specialized in other forms of sport. A third quality, an element of danger, can be of high significance in enhancing the good effect on the moral nature of the performer. We wisely condemn foolhardy actions in that a proper survey and assessment of risk are not brought into consciousness or are dismissed as trivial; many races with motor-car and motor-cycle and some steeplechasing belong to this category. Adam Lindsay Gordon's verse on the subject of danger in sport may not be considered good poetry, but it voices a doctrine which we must applaud:

> No game was ever worth a rap
> For a rational man to play
> Into which no accident, no mishap
> Could possibly find its way.

Even cricket is not without its body casualties. When it is known and kept in mind that a slip may mean death, often imperilling other participants, both body and nervous system are keyed up. Cliff-climbing and mountaineering are perhaps the finest examples of danger bracing the mind and toughening the body. In this same group may be included those activities in which the human body finds itself pitted against powerful forces and formidable obstacles imposed by Nature. Mountaineering may again be cited in this connexion, also gliding and canoeing down fierce river rapids. Finally, a word should be said concerning the value of pleasure accompanying the exercise. The qualities already discussed are capable of making their contribution, but often a purely muscular function can be made more attractive and less a task if accompanied by music. Dumb-bells in solitary use can be boring, but in company and adjusted to the lilting rhythm of simple music their use can arouse pleasurable feelings and thus be of greater service.

Games involving strength and speed make heavy demands on the circulation. The expenditure of energy in unit time can, in extreme cases, exceed one horse-power in a human body, but the heart cannot supply the muscles with the oxygen needed, and so, as A. V. Hill has demonstrated, the contractile elements of muscle get into an oxygen debt, which deep breathing subsequent to the cessation of action pays off. In middle age the heart has not the resilience it possesses in youth, and so the exercise chosen must fit the circulatory capacity. We may smile at a young man in full athletic vigour playing bowls, but at least he is not harming himself; on the other hand a man of middle age indulging in a vigorous bout of tennis makes the medically trained onlooker shake his head in some dubiety. Making every allowance for declining strength in cardiac action and lessened arterial elasticity, we may hold the view that every age is the better for some exercise; in youth Nature usually sees to this

unaided, but there is a veritable danger in later years of the muscular and circulatory systems being given too little to do. Goldsmith wrote concerning his dream of retirement:

> To husband out life's taper to the close
> And keep the flame from wasting by repose.

Goldsmith never entered the autumn of life, dying at the age of forty-four years, but his advice is often accepted too literally. One of the responsibilities of the family doctor is to instruct the elderly patient regarding the duration of his rest in bed and what light physical activities he may venture to pursue. This is a personal problem, which no one is better fitted to discuss and solve than the family doctor.

A word may be added here concerning the distribution of the skeletal muscles involved in various sports. Too often in tennis and fencing is the right arm given an overwhelming preponderance of action leading to a marked departure from bilateral symmetry in the thorax. Every tailor knows that a man's shoulders are rarely symmetrical and the cut of the coat has to be adjusted to this. When one arm has the lion's share of work in any exercise, this inevitably brings about a distortion of the thorax. In the boxer and swimmer the spinal column keeps to the middle line just because there is no preponderance of action in either side; but the tennis player and the bowler in cricket often display an easily detected curvature. This consideration is not given in sport the attention it deserves.

Current Comment.

CORTISONE AND THE MANAGEMENT OF PROGRESSIVE EXOPHTHALMOS.

THE type of progressive exophthalmos often called malignant exophthalmos presents difficult problems of diagnosis and management. The fact that it may in time endanger the patient's eyes makes it imperative that it be recognized early and treated effectively if possible. Uncontrolled, the condition may go on to the development of papillœdema, with later loss of vision and optic atrophy. Corneal damage and ulceration develop, the conjunctiva becomes inflamed, and the final result may be blindness and enucleation of the globe. Thus, as W. McK. Craig and H. W. Dodge, junior, have pointed out,[1] malignant exophthalmos assumes a very sinister clinical aspect. They discuss the forms of surgical relief that have been devised for the increased intraorbital pressure and describe as the most nearly complete method that of Naffziger, which with certain modifications has been adopted by most neurosurgeons. In this, intracranial decompression of the orbits with removal of the superior and lateral walls allows for a considerable degree of relief of pressure. In many of their own cases Craig and Dodge have introduced other forms of treatment before or during operative intervention, and they admit difficulty in evaluating the various methods of surgical treatment. However, despite the improvement that has occurred in a fair number of cases, they "still have the feeling that this is not a completely ideal form of treatment". Many others will undoubtedly agree with this "feeling".

Another quite different form of treatment that has been investigated on both sides of the Atlantic in the past three or four years is the administration of cortisone and ACTH. The rationale of this is not clear, but then neither is the cause of malignant exophthalmos. According to L. W. Kinsell, J. W. Partridge and N. Foreman,[2] the disease probably has its basis in an effect of thyrotropin *per se* or of some material of pituitary origin which is intimately associated with thyrotropin. The local pathological condition consists of the retrobulbar accumulation of a tissue in which mononuclear cells, mast cells and fat may be prominent, and of mononuclear cell infiltration and fibroplastic proliferation in the extraocular muscles. Kinsell, Partridge and Foreman suggest, therefore, that ideal treatment would consist of the administration of an agent which would both inhibit the excess thyrotropin and cause a "lysis" of the abnormal tissue in the extraocular muscles and behind the eye. They quote findings of other workers from which it seems probable that ACTH and cortisone do exert some inhibiting effect upon thyrotropin, although this concept has not been fully accepted or confirmed. Kinsell, Partridge and Foreman undertook an investigation into the subject because of the known "lytic effects" of adrenal steroids upon mononuclear cells and with the working hypothesis that sufficient amounts of corticotropin and cortisone and related steroids would indeed inhibit thyrotropin production. Over a period of two years they observed a group of nine patients, all of whom had exophthalmos of severe or moderately severe degree, in association with obvious or probable thyroid dysfunction. The findings suggest that the systemic administration of corticotropin (ACTH) and the local and systemic administration of cortisone and hydrocortisone will modify thyrotropic or malignant exophthalmos favourably to the patient, probably as the result of lysis of abnormal extraocular tissue or of inhibition of thyrotropin production or of both. This appears sufficient in many cases to eliminate the need for decompression surgery of the orbit in patients with exophthalmos of severe enough degree to endanger one or both eyes. Intensive and often prolonged therapy is apparently necessary, including continuous intravenous drip administration of ACTH solution for the first three days. In the view of Kinsell, Partridge and Foreman, the inadequate therapeutic response in many investigations has been due to inadequate dosage, and this may, with due respect to other relevant factors, explain the inconclusive results reported.

This last-mentioned view is supported, at least tentatively, in a report just published[1] on a therapeutic trial of cortisone and ACTH in exophthalmos and exophthalmic ophthalmoplegia by a panel appointed by the Medical Research Council in Great Britain. The report of the panel, which was under the chairmanship of Sir Russell Brain, provides details of 28 patients treated. The original interest is stated to have been in examples of exophthalmic ophthalmoplegia of progressive or malignant type, but during the course of the trial patients with lesser degrees of proptosis and without ophthalmoplegia were also included. In general the usual doses of the drugs were given. The overall results were disappointing; 20 patients showed no beneficial effect, five showed slight temporary improvement, and three responded well. The reasons for this disparity in individual response are described as not immediately obvious, but reference is made to the report of Kinsell, Partridge and Foreman; in the light of this, the possible significance of inadequate and insufficiently prolonged dosage is accepted. For further trials it is suggested that the dosage be considerably increased and that special consideration be given to the use of serial intravenous infusions of ACTH, perhaps combined with dietary restriction of sodium (of four patients in the series submitted to a low sodium intake, three showed appreciable improvement). The best results (especially reduction in chemosis) were obtained in patients whose exophthalmos was of recent origin or had suddenly and rapidly progressed; the report particularly recommends that for such patients the drugs are worthy of further trial. A group of patients whose proptosis was unaccompanied by chemosis and œdema, and usually by ophthalmoplegia, showed the least response to treatment. Coexisting thyrotoxicosis was reduced in a number of cases, and half of the patients concerned derived local benefit from treatment.

[1] *S. Clin. North America*, August, 1952.
[2] *Ann. Int. Med.*, May, 1953.

[1] *Lancet*, January 1, 1955.

It must be remarked that the studies quoted were not controlled, and the results are still not conclusive. Useful preliminary clearing of ground has taken place, and the groups are defined in which it will be worth while to carry out further trials (with adequate controls, we hope). Incidentally, apart from the therapeutic possibilities, Kinsell, Partridge and Foreman describe one case which suggests that the procedure may have value in the differential diagnosis between thyrotropic exophthalmos and exophthalmos resulting from retrobulbar tumour. This aspect deserves further consideration.

THE TREATMENT OF ACUTE HÆMATOGENOUS OSTEOMYELITIS.

J. TRUETA, who is now Nuffield Professor of Orthopædics in the University of Oxford, was responsible in 1946 for the reintroduction of early surgery in the treatment of acute hæmatogenous osteomyelitis, using it as a complement to penicillin. This measure was adopted to prevent the condition from becoming chronic. It was believed that the stripping of the periosteum from bone by the subperiosteal collection of fluid led to ischæmia of the bone, necrosis and the formation of large sequestra. Trueta and J. D. Morgan[1] now present a close scrutiny of 100 cases in which this principle was followed. For the purpose of inclusion in this series four criteria were established: (i) positive findings from clinical history and examination, (ii) positive operation findings, (iii) positive results from bacteriological examination, (iv) positive bone changes in the radiographs. In all cases at least three of the criteria and in the majority all four are positive. The treatment used has been as follows. On admission to hospital, the patient is carefully examined by an experienced surgeon, and an accurate estimation is made of the site and intensity of bony tenderness. Blood is removed for culture, sedimentation rate test and white cell count. The affected part is immobilized and, if possible, elevated in such a way that the region may be reexamined without disturbing the patient. Penicillin treatment is begun with a dosage of 1,000,000 units per day, given either by continuous intramuscular drip or by repeated injections at three-hourly intervals. Twenty-four hours after the patient's admission to hospital, the same surgeon reexamines the patient, accurately observing the amount of tenderness of the suspected area, the temperature and the result of the blood sedimentation test. Unless the tenderness has greatly decreased from that of the previous examination in either extent or intensity, the patient is prepared for operation under general anæsthesia. The operation is performed under a tourniquet, the periosteum is split, the abscess is evacuated, several small drill holes are made through the cortex, penicillin powder is sprinkled in the wound and the skin only is sutured without drainage. Five days after operation, any hæmatoma is aspirated. Ten days after operation the sutures are removed, and a complete plaster cast is applied to prevent pathological fracture. Penicillin treatment is continued for three weeks and then reviewed. Immobilization is continued while there is evidence of inflammation. Trueta and Morgan still stress the point that the crux of treatment of acute hæmatogenous osteomyelitis is primarily early diagnosis with institution penicillin treatment in doses of a high enough concentration for a sufficiently long period. If the treatment can be started early enough, it is possible to prevent altogether the appearance of bone changes. In the ordinary case met with four or five days after the first symptoms, early operative treatment aids the healing of bone by allowing revascularization of the devitalized area of the cortex to take place from the periosteum. Some overgrowth of the bone may be expected in cases in which the shaft has been severely involved. Imbalance of the foot or wrist by overgrowth of the affected bone may need a secondary corrective operation. Reduced bone growth is now uncommon. Trueta and Morgan have followed the patients in this series for from eight to two years. Complete healing of bone has so far been obtained in 66 cases. It is interesting to note that in three cases only was the organism reported to be relatively insensitive to penicillin, and in one case only was another antibiotic (streptomycin) used.

This excellent report from such an authority as Trueta has come at a very opportune time, when there is a spreading pessimism about the value of penicillin in the treatment of acute hæmatogenous osteomyelitis, as well as considerable lack of understanding of the role that surgery plays in the management of this disease. Several factors may be suggested as contributing to this pessimism: (*a*) the use of depot type of penicillin instead of frequent doses of crystalline penicillin of adequate concentration, (*b*) the tendency to discontinue the penicillin treatment too soon, (*c*) failure to evacuate a subperiosteal abscess early enough. The introduction of penicillin in the management of acute hæmatogenous osteomyelitis produced such ideas as that the treatment of this condition should be in the hands of pædiatricians and physicians and that surgery no longer had a place in it. Unfortunately these ideas were not sound, but they led to a certain complacency among those responsible. This complacency has produced results worse than anticipated with a consequent slur on the adequacy of penicillin in the treatment of the condition. Trueta and Morgan's article will help to restore the balance.

[1] *Brit. J. Surg.*, March, 1954.

BACTERIAL GROWTH AND THE EXPOSURE TREATMENT OF BURNS.

DURING the past few years, the exposure method of treating burns has been revived. A number of reasons have been put forward in its favour, one of which is the assertion that a dry surface such as that which forms over an exposed burn does not favour bacterial growth. A. B. Wallace[1] wrote in 1951 that the outstanding feature which had justified his change to the exposure method of treatment had been the more effective control of infection. He stated that at the beginning of the study which he was reporting, cultures were taken from all burnt surfaces from day to day. In the first 200 cases there was no example of infection with hæmolytic streptococci, *Pseudomonas pyocyanea* or *Proteus vulgaris*, and the burnt surfaces had never become offensive. In the past eighteen months routine cultures had been considered unnecessary, but those that were prepared had given results similar to the first group.

The question has now been raised critically by E. J. L. Lowbury, D. J. Crockett and D. M. Jackson.[2] They point out that up to forty-eight hours from the time of burning, the burnt surfaces are moist, and bacteria settling on them may be expected to grow and to continue growing under the eschar when it has formed. They present evidence in support of this view together with other data suggesting that more rather than fewer contaminant pathogens may flourish on burns treated by exposure than on those treated by the closed method with local penicillin prophylaxis and the use of an air-conditioned dressing station. They found that burns treated by exposure yielded heavy growths of *Staphylococcus aureus*, *Streptococcus pyogenes* and *Pseudomonas pyocyanea* and other pathogens from the inner surface of eschars when the dry outer surface yielded scanty bacteria on culture. Exposed burns of the face showed a higher incidence of acquired *Streptococcus pyogenes* than did burns of other regions; the lowest incidence of *Streptococcus pyogenes* and *Pseudomonas pyocyanea* was found on burns on hands and feet which could be adequately covered and were dressed with penicillin cream in an air-conditioned dressing room. Burns of the trunk treated by exposure showed *Strepto-*

[1] *Lancet*, March 3, 1951.
[2] *Lancet*, December 4, 1954.

coccus pyogenes and *Staphylococcus aureus* slightly more often than did simpler burns treated by the closed method. *Pseudomonas pyocyanea* and coliform bacilli were somewhat commoner in closed than in exposed burns, presumably because these bacteria are more readily killed by evaporation of their suspending medium than are Gram-positive cocci. Lowbury, Crockett and Jackson emphasize the fact that burns treated by the closed method were protected against added infection in other ways: by the use of penicillin cream against *Streptococcus pyogenes* and by the no-touch dressing technique in an air-conditioned room with filters. They agree that without these additional prophylactic measures the added infection rate of burns treated by the closed method would certainly have been nearer to that of the exposed burns.

They point out that their data are not presented as a case in favour of the closed and against the exposure method of treating burns. They do, however, show that one of the chief arguments originally used in support of the exposure treatment, namely, the alleged protection against pathogenic organisms, is not supported by their study. They consider that a place still exists for both kinds of treatment, and exposure is often indicated on clinical grounds or because adequate cover with dressings is impossible. As has been pointed out in these columns on a previous occasion,[1] the exposure method also promises advantages in the undesirable eventuality of having to treat large numbers of casualties from burns in the event of war.

A NEW ACID-FAST BACILLUS IN SWIMMING POOLS.

A NEW acid-fast bacillus has been found occurring in swimming pools in Sweden and capable of producing skin lesions in humans. It has been described in a monograph by F. Linell and A. Nordin[2] and called by them *Mycobacterium balnei* (from the Latin *balneum*, a bath). The lesions were first observed in a few children in a Swedish village, and biopsy tissue led to the provisional diagnosis of tuberculosis. However, a search amongst school children in the district revealed 75 others with similar chronic lesions, and only one case of tuberculosis was known locally. It was noticed that those affected were all keen swimmers and trained in a pool, and immediately cultural studies were instituted on the bathing pool and on the patients. Biopsy material from 19 patients yielded in three cases an acid-fast organism growing on Löwenstein-Jensen medium after nine to twelve days at 31° C. and not at 37° C., and they produced no lesions in the guinea-pig. The thermal death point was tested, and heating for ten minutes at 56° C. was found to be sufficient to kill saline suspensions. At room temperatures, cultures slowly developed pigment. Some strains tended to form cords in glycerol fluid medium, but the neutral red test yielded negative findings. The organism was not affected by sulphathiazole, penicillin, chloramphenicol or the tetracyclines; but it was completely inhibited by streptomycin in a concentration of 64 microgrammes per millilitre in Sauton's medium; and also by tyrothricin. The cultures injected intradermally into guinea-pigs produced transient nodules and no adenitis, and histological examination showed granulomatous inflammation only. Local lesions in rabbits could be produced by rubbing cement scrapings from the walls of the pool into the shaven skin. Mice inoculated intraperitoneally showed dissemination of the infection, and many animals died. Examination of the tuberculin test results amongst the patients was complicated by the practice of B.C.G. vaccination and testing. However, some animal experiments and the results from a small group of human volunteers suggest that human infection by *M. balnei* is followed by the occurrence of a positive reaction to tuberculin. The final phase of the investigation was the cleansing and rebuilding of the swimming pool and the installation of a more efficient system of chlorination of the water, after which cases ceased to occur.

This monograph presents clearly the results of a detailed study of a small naturally occurring epidemic of a mycobacterial infection of the skin and its diagnosis, treatment and control. Recognition of the importance of the observations of P. MacCallum, J. C. Tolhurst, G. Buckle and H. A. Sissons[1] led to identification of the organism by use of low temperatures of incubation. The finding of an organism which would grow at 31° C. and not at 37° C. and which failed to produce lesions in the guinea-pig soon established it as a new pathogen. There is recorded also the finding of a pigment-producing saphrophyte during the tests of material from the pool as a further bacterial control of the identity of the new organism. Public health workers will be interested in the account of this new organism and will be reminded yet again of the Pasteurian dictum that chance favours the prepared mind.

[1] M. J. AUSTRALIA, June 9, 1951.

[2] *Acta tuberc. scandinav.*, Supplement 33, 1954.

MORE WORK WITH LESS EFFORT.

WHEN machines are used to carry out complex tasks, it is often vital that the machines and those who work them should "fit" one another. Making sure that this is so has become an increasingly difficult problem in our technological age. The old method of meeting the difficulty was to select people for the machines which they would have to operate. This was all very well up to a point, but in the long run it was found to be complicated by human limitations. This situation was brought to the fore during the second World War through such developments as radar and high-speed aircraft, and it became clear that personnel selection methods were not enough. An active endeavour would have to be made to "fit" machines to men if the most effective operation was to be secured. Since the war this idea has been carried over into industry generally and has greatly influenced machine design. It has also stimulated valuable research into the design of such things as seating and clothing, and, as a necessary prerequisite, into exact human body measurements and the relation of postural adjustments to various tasks and conditions. In 1950, the Ergonomics Research Society was founded in Britain with a view to bringing together those who used these different approaches to the study of the relations between man and his working environment. In 1951, the young society held a symposium at Birmingham at which various aspects of the problem of equipment design were described, and the papers making up the symposium, which have now been published, are worthy of careful attention.[3]

Ergonomics is a neologism that will no doubt serve its purpose quite well. J. C. Lane,[3] in an excellent paper on the subject read at the Melbourne Congress in 1952, favoured the term "human engineering", but this scarcely covers the wider application now being adopted.

In his opening address at the symposium, Sir Ben Lockspeiser, the Secretary of the Department of Scientific and Industrial Research, quoted from a Birmingham newspaper the simple definition of ergonomics as "the business of doing more work with less effort"—an attractive thought, however one looks at it. He hastened to point out that it would be a mistake to give the impression that by giving the name of ergonomics to the study of the relation between man and his work environment a new science had been invented. Rather was it that the approach to the practical problems in this field had, until quite recently, been largely empirical. Not that progress in the design of machinery has been haphazard or without proper direction. The design engineer has, in the past, done very well with little guidance from the biologist and with little

[1] *J. Path. & Bact.*, January, 1948.

[2] "Symposium on Human Factors in Equipment Design", edited by W. F. Floyd and A. T. Welford: 1954. London: H. K. Lewis and Company, Limited. 9¼" × 6¼", pp. 140, with 34 illustrations. Price: 21s.

[3] M. J. AUSTRALIA, July 4, 1953.

basic training himself in human anatomy, physiology and psychology, but these things are of major importance when it comes to determining the criteria by which a successful machine design is to be judged. Lockspeiser suggests that the engineer has tended to rely too closely on measures of engineering efficiency expressed as a ratio of work output to input. This has led to the paying of too exclusive attention to reduction of the physical effort necessary by the operator. It is too readily believed that any equipment which reduces the physical effort of the operator inevitably increases output and reduces fatigue, but in these matters of human activity at work regard must be had to the whole man, and particularly to the integrated action of the sensorimotor system. The reduction of the load placed on the motor system (that is, the reduction of muscular effort) has very often involved an increase in the load imposed on the sensory side. The operator is required to pay increasing attention to dials, indicators and controls to an extent that is liable to overload the sensory side of the nervous system or to call for excessively intricate coordination of sensory and motor functions. Such a state of affairs, quite as much as sheer muscular effort, induces what is commonly falled fatigue—a condition of which there is little scientific understanding, but which must clearly involve both psychological and physiological components. Thus, despite the incompleteness of our knowledge of the fundamental biological problems involved, enough is known to justify the introduction of biological considerations as a distinctive contribution to machine design. The stage to introduce the biologist is not when the machinery and equipment have reached the stages of production and use, but during the earliest stages of preliminary design, prototyping and field trial. This is, of course, a restricted application of a much wider principle. If workers in any of the many sections of the biological field can bring forward exact data, sufficient to win the respect of those who work in what are generally regarded as more exact fields of science, then the way is open to humanize not only industry but also many other parts of our everyday living in which an unimaginative technology is exerting unwarranted tyranny through noise, ugliness, monotony, enforced uniformity and the rest.

For anything like adequate comment the individual papers of the symposium would need separate treatment. Brief reference will suffice here. The question of the anatomy of work was in the capable hands of Professor W. E. LeGros Clark. Many interesting points are brought out in his paper in the light of existing knowledge; but it is made clear that astonishingly little is still known about the mechanical capacity of the human body working under natural conditions, and the paper should provide a stimulus to those who are prepared to see the importance of living anatomy. Other papers by anatomists deal with body measurements of the working population and the range and strength of joint movement. Application of knowledge in this field is seen in papers on body size and work spaces, and in a paper on chairs and sitting by a well-known worker in this field, Bengt Åkerblom. Physiologists deal with such subjects as the effects of climate on man, heat loss by radiation and convection, circulatory insufficiency of the subject in the standing position and physical working capacity in relation to sex and age. In the overlapping field of physiology and psychology are papers on perceptual problems involved in observing displays, the human response to variations in the design of a visual indicator, speed stress, movement and force in sensorimotor skill and equipment layout. The contributors to the symposium and those who joined with them at the meetings of the Ergonomics Research Society came from a wide range of disciplines—anatomists, physiologists and psychologists from the biological field, together with engineers, physicists, architects and those interested in production and management. All had, as Sir Ben Lockspeiser put it, a common interest in the study and avoidance of those strains to which the human organism is exposed in mind and body under the environmental conditions created by the engineer. Speaking as an engineer, Lockspeiser describes himself as "one of the culprits, so to speak, but with a desire to learn". If that is how the engineers feel about it, then it is up to the biologists to make available what information they have and to set to on the task of acquiring what they lack.

THE HISTORY OF PERCUSSION.

THE diagnostic method of percussion is so intimately associated with the medical school of Vienna that an article on its history in the *Wiener klinische Wochenschrift* by Professor N. V. Jagič, who had already contributed an important survey to an earlier issue of the same journal, does not cause surprise.[1] Auenbrugger (1722-1809) developed and applied the technique of percussion about the year 1754 and published his findings in a book, *Inventum Novum*. Recognition and appreciation were not given. His teacher, his colleagues and his successor ignored the method completely . . . *Propheta in sua patria honorem non habet*. What interest was shown by his contemporaries took that form which is so exasperating to the researcher —"nothing new in it; it has been known for ages". Actually the Hippocratic school had directed attention to the variation of sounds emitted on tapping the abdominal wall in meteorism and ascites; but Auenbrugger not only revived the Hippocratic tradition but subjected the method to a truly scientific investigation, for his findings on the human body were checked by post-mortem dissection and experiments were conducted on cadavers such as filling the thorax with fluid and investigating the sounds given forth by what we would now call direct percussion. At the close of the eighteenth century Stoll in Vienna introduced and taught the method. A little later the eminent Parisian clinician Corvisart, inspired by Stoll's writing, became an enthusiastic convert and translated Auenbrugger's *Novum Inventum*. Piorry, another French clinician, actually professor in Paris in the first half of the nineteenth century, introduced mediate percussion by laying a coin on the patient's chest and abdomen and tapping this; a little later he invented a pleximeter of ivory. Then Winternich introduced a hammer armed with rubber with which to strike the pleximeter. Then came in Vienna Josef Skoda, to whom the modern theory and practice of percussion owe so much and who gave to medicine the finger-finger mediate method. Several minor changes came later and were associated with various clinical practitioners. Professor Jagič will not concede that Röntgen ray profiles have ousted percussion; according to him each has its place and each can give something the other cannot. Percussion according to him is "an indispensable technique".

AN X-RAY STUDY OF THE PROXIMAL END OF THE FEMUR.

ANOTHER supplement has been published by *Acta radiologica* and is devoted to a study of the proximal femoral end.[1] It is the work of Lars Billing and is the result of an extensive radiological study undertaken between March and December, 1953. The minute details of positioning of the limb have entailed careful study with detailed recordings of results. This work must have consumed much time owing to the repeated examinations necessary. The work is interesting, but it is doubtful whether the results reported are in any way superior to those obtained by the usual routine examinations, as carried out by an experienced radiologist working in a well-equipped radiological laboratory. The main point stressed is that the end of this long bone must be projected without shortening and with the central beam perpendicular to the axis of the bone. Antero-posterior and lateral views are necessary. This ideal may be obtained in ordinary departments without recourse to abstruse formulæ running almost to places of decimals. In conclusion, the monograph may be described as interesting, but not of great help to the expert radiologist.

[1] *Wien. klin. Wchnschr.*, September 3, 1954.

[1] *Acta radiol.*, 1954, Supplementum 110.

Abstracts from Medical Literature.

OPHTHALMOLOGY.

A Simplified Ptosis Operation.

CHARLES E. ILIFF (*Am. J. Ophth.*, April, 1954) describes a simplified operation for ptosis in which he shortens the levator and Müller's muscle. He describes his technique fully and recommends the operation in all cases in which even only a small amount of levator action is present and even in cases in which there is no levator action. The operation does not interfere with superior rectus surgery should this be necessary if the first operation fails.

Pyocyaneus Ulcer.

R. K. WILLIAMS *et alii* (*Am. J. Ophth.*, April, 1954) report a patient with a pyocyaneus ulcer of the cornea treated with streptomycin given subconjunctivally and intramuscularly and "Aureomycin" given by mouth. The final visual acuity was 6/6. With a culture prepared from organisms isolated from the ulcer rabbit corneas were inoculated, and the effects of various therapies were studied. The authors conclude that the best treatment for pyocyaneus ulcer of the cornea is subconjunctival injection of 50,000 units of polymyxin B daily and instillation of polymyxin solution hourly.

Equatorial Cataract After Corneo-scleral Trephining.

H. E. HOBBS AND REDMOND SMITH (*Brit. J. Ophth.*, May, 1954) report four cases in which lens changes occurred after trephining. In all cases there were capsular adhesion at the operation site, the presence of a history of congestive attacks and delayed reformation of the anterior chamber. The capsular adhesion probably forms at or shortly after operation owing to forward thrust of the pressure behind the lens. The authors suggest that this complication may be prevented by lowering the tension by retrobulbar injection or posterior sclerotomy before performing the corneo-scleral trephine.

Carbonic Anhydrase Inhibitor and Acetazoleamide.

GOODWIN M. BREININ AND HEINZ GORTZ (*Arch. Ophth.*, September, 1954) have studied the effect of "Diamox" on intraocular tension. They state that "Diamox" inhibits carbonic anhydrase, and as a consequence bicarbonate enters the aqueous at reduced concentration; the aqueous sodium concentration is likewise reduced, and there then follows a fall in osmotic pressure, which results in less water influx and a lowering of the intraocular pressure. In a clinical trial the authors had greatest success with secondary glaucoma, especially glaucoma associated with uveitis; this may be due to the fact that in these cases shorter periods of treatment were required. In chronic glaucoma with prolonged treatment there may be an initial fall in pressure followed by a refractory state. The authors noted that there was a strong synergism with miotics. They found that the best dosage was 500 milligrammes in the morning and 250 milligrammes at night until the pressure was brought to normal and then 500 milligrammes in the morning. There were a few toxic reactions, but none severe enough to warrant cessation of therapy. The drug is contraindicated in the presence of acidosis and hepatic cirrhosis.

Peripheral Iridectomy.

OTTO BARKAN (*Am. J. Ophth.*, June, 1954) describes the technique and mechanism of peripheral iridectomy in narrow-angle (iris-block) glaucoma. In early cases the action of iridectomy is complete provided the incision is sealed. It normalizes the pressure in those cases in which the trabeculum is not obstructed by adhesions or its permeability has not been reduced by previous contacts with the iris. The author describes two methods of performing peripheral iridectomy, one through an ab-externo incision, which is sealed by suture, and the other with a self-sealing valve-like corneal incision. The author prefers the ab-externo incision. It is recommended as a safe and effective operation for early narrow-angle glaucoma and as a prophylactic measure.

"Diamox" in Glaucoma.

W. M. GRANT AND P. R. TROTTER (*Arch. Ophth.*, June, 1954) report on the use of "Diamox" in normal and glaucomatous patients. They state that the dose of "Diamox" ranged from 125 to 500 milligrammes given orally every twelve hours, and in a few cases a single injection of 250 to 500 milligrammes was given intravenously. "Diamox" had little effect on normal eyes. In two cases of acute narrow-angle glaucoma the effect was dramatic, the miotic being continued during the giving of the "Diamox". In open-angle (chronic simple) glaucoma the effect was beneficial. "Diamox" was also useful in two cases of acute glaucoma secondary to iridocyclitis. There was no response in cases of glaucoma due to extensive peripheral anterior synechiæ. It is probable that "Diamox" exerts its action by decreasing the rate of formation of aqueous.

Lid Mobilization and Tarsorrhaphy for Massive Proptosis.

SAMUEL GARTNER AND MAX CHAMLIN (*Arch. Ophth.*, August, 1954) describe a method of approximating the lids in massive proptosis due to orbital tumour or thyrotropic exophthalmos. They state that the ordinary methods used are unsatisfactory, as the pressure of the globe nearly always causes rupture of the tarsorrhaphy. The procedure should be reserved for those cases in which the tarsorrhaphy is to be permanent.

Ocular Tuberculosis.

ALEC C. WOODS (*Arch. Ophth.*, August, 1954) discusses the pathology, immunology and treatment of ocular tuberculosis. In describing treatment he mentions the indications for the use and dangers of adrenocortical hormone. He favours the use of tuberculin as a means of removing tissue hypersensitivity and also the use of streptomycin, PAS and isoniazid for direct attack on the tuberculosis.

Air Injection in Traumatic Hyphæma.

JOHN M. WILSON *et alii* (*Am. J. Ophth.*, March, 1954) outline their treatment of traumatic hyphæma with special endeavour to prevent the occurrence of secondary hæmorrhage. All patients with traumatic hyphæma are admitted to hospital, and air is injected into the anterior chamber. They are placed on complete bed rest for four or five days, and only the injured eye is occluded. No local medication is advised except atropine after the fifth day if there are signs of iritis. Anti-hæmorrhagic drugs are given empirically, and sedatives are administered.

Ocular Manifestations of Rosacea.

A. J. B. GOLDSMITH (*Brit. J. Dermat.*, December, 1953) reviews the literature on the ocular manifestations of rosacea and discusses the symptoms. He states that blepharitis is not uncommon and is characterized by thickening of the lid margins and scaly desquamation of the skin. Chalazia (frequently) and styes (occasionally) occur as concomitants. The patients are frequently subjects of seborrhœa. Diffuse hyperæmic conjunctivitis occurs frequently in association with blepharitis and is manifested by a general infection of the conjunctival vessels and a scanty, watery discharge. Occasionally there are small marginal catarrhal ulcers. These are different from the true rosacea keratitis, which is described in detail later in the paper. The small marginal ulcers are confined to the margin of the cornea, do not advance towards the centre and rarely become vascularized. They heal readily with the local use of antibiotics lethal for streptococci and with general administration of riboflavin alone or with the other constituents of the vitamin *B* complex. Other ocular concomitants of facial rosacea which are never seen in the absence of typical skin lesions of rosacea are nodular infiltrations of the conjunctiva, episcleral tissues and cornea. Nodular conjunctivitis and episcleritis are both rare. Severe rosacea keratitis is, of course, the most serious and crippling manifestation of rosacea as a whole, leading in many cases to impairment of vision. It begins as a symptomless peripheral vascularization of the cornea. In more serious cases this is followed by subepithelial infiltration in the superficial layers of the cornea, which is confined almost exclusively to the lower two-thirds of the cornea. There is no ulceration to begin with, but the sodden epithelium may be rubbed off by the lids. These nodular infiltrates heal, and vessels grow into the scarred area from the periphery of the cornea. The condition has a tendency to relapse, and fresh infiltrates appear, not on the old scar, but nearer to the centre of the cornea. After several mild attacks a series of wedge-shaped scars are left pointing to the centre of the cornea and interfering with vision more or less seriously. Probably the keratitis and the rosacea have the same pathogenesis. Corneal vascularization, which is a precursor of keratitis, cannot occur as a result of pure vasodilation; there

is some experimental evidence, but no clinical evidence, that it may result from gross metabolic disturbances. There is no evidence that bacterial infection plays any part. The pathological appearances are non-specific, and there is no valid evidence to suggest that ocular disease has an allergic basis. Seasonal attacks of keratitis are noted, especially in the spring; so photosensitization may have something to do with them. The author quotes Windeyer of Middlesex Hospital, who treated 54 patients with X rays, which were applied to the cornea by cross fire; a total dosage of 400*r* was given in four divided doses at weekly intervals. This appears to be the most effective treatment available at present.

Comparison of Refraction Results.

ALBERT E. SLOANE *et alii* (*Am. J. Ophth.*, May, 1954) report on the refraction of 21 subjects by two ophthalmologists and one optometrist. The subjects were of above average intelligence; the examination conditions were ideal, and the examinations were conducted in a leisurely manner. On no one subject did all these examiners obtain identical results for naked vision, and to only one did they give the same correction. The differences of the degree shown in the data may be considered "expected variations". The authors conclude that one cannot reasonably be dogmatic about a refractive error.

OTO-RHINO-LARYNGOLOGY.

Local Use of Hydrocortisone Acetate in the Nose.

T. T. SMITH (*Arch. Otolaryngol.*, July, 1954) states that the successful application of the corticoids locally to the eye, skin and joint surfaces has stimulated thinking along this line in rhinological problems. Hydrocortisone appears to be the most important natural corticoid. Reports indicate that it is an effective agent in suppressing hypersensitivity phenomena, acting more intensely than cortisone, and especially so at a local tissue level. Its use in the nose in allergy offers intriguing possibilities. In the response of a shock organ to an allergen fluid escapes into the ground substance of the tissue with changes both in the ground substance and in the connective tissue cells. The mechanism of this escape of fluid is not clearly understood. The knowledge that hyaluronidase can do this and that there is a reasonable increase in non-specific antihyaluronidase in the blood in connective tissue damage due to stress would suggest that hyaluronidase plays a part in this effect. It would seem safe to accept the view that this system is in some manner connected with the stress hormones of the adrenal cortex. Clinically it has been repeatedly observed that corticotropin (ACTH) and cortisone reverse the changes seen in allergic phenomena. The effect appears to be non-specific and is not intimately related to the antigen-antibody mechanism. It has been shown that intense adrenocortical stimulation does not significantly alter the ability of tissues to liberate histamine-like substances, nor does this alter the tissues' ability to respond to these substances. Yet the ability of cortisone, hydrocortisone and corticotropin to control this phase in allergic reactions is a known clinical fact. It would appear that the poorly understood action of these hormones must be on the ground substance of tissue. The observed favourable effects on the allergic process may lie in the alteration of the stress reaction of the shock tissues. This response inhibition is most likely mainly the result of the influence of this hormone group on the hyaluronidase system with some direct action on capillary permeability. It would thus seem that adequate local application of these hormones, especially hydrocortisone, to the shock organ in nasal allergy (the nasal mucosa) would alter the stress reaction of the tissue and produce the desirable local effects without unwanted systemic effects. Such therapy should be an adjunct in relieving the tissue reactions until hyposensitization treatment has successfully controlled the antigen-antibody reaction. Hyposensitization has seemed much more effective following local application of hydrocortisone. A total of 53 patients with proved upper respiratory inhalant allergy were selected for local treatment with hydrocortisone. Hyposensitization was carried out at the same time and seemed more effective following application of the hydrocortisone. Local applications of 2·5% hydrocortisone acetate nasal jelly gave effective relief in four out of five patients who had mild symptoms. The results were disappointing following submucosal injection of 0·5 millilitre of hydrocortisone suspension into the inferior and middle turbinates. The injection of one millilitre of 2·5% hydrocortisone nasal jelly into certain cases of non-suppuration maxillary sinusitis also gave disappointing results.

Chloramphenicol-Boric Acid Powder in Otitic Infections.

P. P. HEARN (*Ann. Otol., Rhinol. & Laryngol.*, June, 1954) states that it is concluded from a number of reports that the ætiological agent of otitic infections is most frequently a bacterial infection of either Gram-negative or Gram-positive organisms or a mixed infection of both. Chloramphenicol is effective against both groups of bacteria. Fungi and protozoa are not affected by its use. It has been suggested that this antibiotic is probably more efficient when applied directly to open wounds than when administered by mouth. The normal acidity of the skin of the external auditory canal is of importance. The pH of the skin of the diseased external auditory canal is usually alkaline. An investigation was undertaken by the author on the use of chloramphenicol-boric acid powder in the treatment of otitic infection. The mixture used consisted of four parts of boric acid (U.S.P.) and one part of chloramphenicol, in a water slurry; this had a pH of 4·0. The mixture meets all the requirements of an ideal therapeutic agent in that it is effective against a wide range of organisms, it is easy to apply, and does not interfere with the elimination of discharge or debris; no clumping or caking takes place. Further it is in an acid medium, it has a drying effect, and it is non-toxic and non-irritating. Thorough cleaning and drying of the external auditory canal before applying any medicament is of prime importance, so that whichever agent is used may be brought into intimate contact with the tissues. The clinical study covered 53 patients with 78 ears affected by diffuse *otitis externa*, 12 patients with 13 ears affected by chronic suppurative *otitis media*, and four patients with old infected radical mastoid cavities. After careful cleansing with swabs and suction, the entire canal wall and drumhead, or the middle ear and mastoid recess, were carefully "frosted" with the powder blown in from a powder blower. Except for patients with acute conditions office visits were every four to five days. Wetting was avoided. In cases of furunculosis staphylococcus toxoid or X-ray therapy was given. A preparation of 10% boracic in anhydrous lanoline was prescribed for local application at home. In 89 of 95 infected ears, the ears became dry. Failure was noted in only three ears. In all the patients with chronic suppurative *otitis media* with central perforations, the ear became dry and clean. In one case with a marginal perforation there was no improvement. In three of four patients with infected mastoidectomy cavities the ear became dry and clean.

Fenestration: Long-Term Results.

E. H. CAMPBELL (*Arch. Otolaryngol.*, September, 1954) states that it is now unnecessary to present evidence of the substantial results that can be obtained with the fenestration operation. The immediate results in ideally suitable patients should be extremely good, the hearing being improved to a practical level in 90% of such cases. In 8% to 10% the hearing is not improved, and occasionally it may be made worse. In approximately 10% of the immediately successful cases the patients will lose all or part of the improvement within three to twelve months of operation. There remain then about 80% of the ideally suitable patients who retain practical hearing improvement for at least two years. If bone regeneration or fibrous tissue formation is going to interfere with the function of the fenestra, it does so in most instances in the usual healing time of five to eight months. In a study of the hearing results over a period of five years or more after the fenestration operation it is apparent that the hearing improvement that is present a year after operation can be maintained at approximately that level for years. Statistics are presented regarding the long-term hearing results on 200 fenestration patients observed and tested audiometrically over a period of five years or more after operation. In a group of 130 successful cases, the average hearing for the three speech frequencies was only 0·5 decibel less at the end of five years than it was at the end of the first year. Statistics published by Adin and Shambaugh show that of 390 fenestration patients followed up for five to ten years 273 (70%) had maintained their hearing improvement. Of the remaining 30%, it was found that 20% had lost a part of their initial gain, 5% had no hearing improvement at all and 5% were considered to have bony closures.

XUM

Congresses.

WORLD CONGRESS OF CARDIOLOGY.

THE second World Congress of Cardiology, organized by the International Society of Cardiology, took place in Washington, D.C., United States of America, from September 12 to 19, 1954, in association with the twenty-seventh annual scientific sessions of the American Heart Association. Thirty-one hundred registrants participated, representing about fifty countries. The President of the Congress was DR. PAUL D. WHITE, of the United States of America. He succeeded Professor Charles Laubry, of France, as President of the International Society of Cardiology. Australia was represented by nine physicians, including two official delegates from the Australasian Cardiac Society. A strong team from the British Cardiac Society was headed by SIR JOHN PARKINSON.

The meetings and exhibits were located in the vast National Guard Armory, which, though adequate in size for such an undertaking, was inconveniently situated, and had to be artificially divided into compartments for the purpose of sectional meetings. This resulted in a high noise level. The more important panels and symposia were held in the largest of these areas, which was capable of seating an audience of one thousand. Simultaneous translation facilities through portable receivers were available for English, French and Spanish, the three official languages of the Congress. An experiment was also tried in the form of written translations of abstracts into "Interlingua", a basic combination of these three tongues. The titles of the larger symposia and panels included world surveys of the distribution of atherosclerosis, the present status of cardiac surgery in respect to both congenital and acquired heart disease, advances in rheumatic fever control, hypertension *et cetera*, while simultaneous sectional meetings were conducted under the headings of physiology, cardio-vascular dynamics, electrocardiography, vectorcardiography, metabolism in heart disease, drugs and other therapies and many other topics.

At these meetings a total of 330 fifteen-minute papers were presented during the week by 1200 authors. Two contributions came from the Hallstrom Institute of Cardiology, Royal Prince Alfred Hospital, Sydney, and PROFESSOR H. SMIRK, of New Zealand, spoke of his lengthy experiences in the management of high blood pressure by use of the methonium components.

The scientific exhibits were excellent, particularly the moulages representing various types of surgery of the heart prepared by the Mayo Clinic. Many other exhibits were concerned with heart sound analysis, electronic recordings, teaching aids, new theories of electrical variations in the heart muscle, rehabilitation of cardiac invalids, constrictive pericarditis, unusual forms of myocarditis, angiocardiography, spectal phonocardiography, pulmonary function testing, cardiac trauma *et cetera*. The trade exhibition covered a great many new instruments and drugs, books and journals, and was well attended. About 30 medical films, covering a variety of historical, physiological and surgical aspects of cardiology, were projected during the course of the meetings.

It is obviously impossible in this account of the Congress to give an adequate description of the material presented. Many of the papers will, no doubt, be published in full later in national medical journals, and Australian participants will have to "brief" their respective hospitals and organizations. The majority of the reports were based upon original laboratory research, but perhaps only about one in eight of the total number were of direct clinical importance. Some were purely of local interest, others statistical, and a few purely philosophical. As five sectional meetings were conducted simultaneously, no observer, however energetic, could attend more than one-fifth of the entire programme. The dominant aspects of heart disease considered at this Congress were cardio-vascular epidemiology, atherosclerosis, advances in cardiac surgery, arterial hypertension, rheumatic fever control, instrumental methods of diagnosis and cardio-vascular dynamics, the metabolism of cardiac muscle and rehabilitation of the cardiac invalid.

A number of memorial lectures were delivered, the most significant of which was the Charles Laubry Lecture given on the final day by SIR JOHN PARKINSON, in the presence of Professor Laubry himself. Sir John paid a high tribute to the senior French cardiologists led by Vaquez and Laubry, by whose emphasis on the importance of semiology and clinical science in this field a proper balance has been maintained between bedside and laboratory aspects of heart disease. Other formal lectures comprised "Experimental Studies in the Nature and Origin of Fibrinoid" by LEWIS THOMAS, United States of America, "The Control of the Peripheral Circulation by the Walls of the Blood Vessels", by A. C. BURTON, of Canada, and "Methods for the Experimental Production of Generalized Atherosclerosis in the Rat", by M. R. MALINOW, of the Argentine. Memorial Lectures to Frank Wilson and to Willem Einthoven were delivered by L. N. KATZ and H. A. SNELLEN respectively.

There were seven symposia, entitled as follows: "Cardio-Vascular Epidemiology: Introductory Remarks", "Atherosclerosis", "Other Ætiological Factors", "The Clinical Value of Instrumental Methods of Diagnosis in Congenital Heart Disease", "Problems of Circulation", "Blood Volume", "Coronary Heart Disease".

Seven panel discussions were concerned with the following: "Congenital Heart Disease: Indications for and Results of Operations in Patent Ductus Arteriosus, Coarctation of the Aorta, Pure Pulmonic Stenosis and Tetralogy of Fallot", "Diagnosis and Management of Rheumatic Fever and Rheumatic Heart Disease", "The Treatment of Hypertension", "Surgery of Congenital Heart Disease", "Surgery of Non-Congenital Heart Disease", "Electrocardiography", "Ballistocardiography".

Thirty-six separate scientific sessions were held on subjects ranging from ballistocardiography and cardio-vascular dynamics to pulmonary heart disease and bacterial endocarditis. Usually about six contributions, each of one-quarter of an hour, comprised each scientific session. Some subjects such as "Cardio-Vascular Surgery", "Physiology", "Rheumatic Fever", "Congenital Heart Disease", "Hypertension" and "Heart Diseases of Uncommon Ætiology" demanded more than one session each. Abstracts of all contributions to the scientific sessions were published in the form of a book containing more than 500 pages. Among the sessions which created the greatest interest and drew the largest audiences were those concerned with the results of operations for congenital and acquired heart disease.

In these, DR. BLALOCK and DR. TAUSSIG were able to report the results of an eight-year follow-up on 255 of 500 patients with pulmonary stenosis or atresia treated by subclavian-pulmonary artery anastomosis. Thirty had exploratory operations, and eighty-one died at or within six months of surgery. Results of a follow-up of the 255 patients showed good results maintained in 63·9%; 6·3% still showed some improvement; 10·6% had second operations; 15·3% had died. SIR RUSSELL BROCK effectively defended his methods of direct relief for pulmonary stenosis and reported 120 such operations. In the first 100 cases the mortality was 15%, but only seven deaths ensued following the last 93 operations. Pulmonary valvotomy was performed in 37 cases, infundibular resection in 45, and combined valvotomy and infundibular resection in 18. The clinical result was described as good or very good in 71% of cases, that is, those with an arterial oxygen saturation of 95% to 98%. Sir Russell Brock denied that his operations resulted in an Eisenmenger complex, and had not observed subsequent aneurysmal dilatation of the infundibulum. He looked forward to open operations in this region in the near future; already he had twice closed a ventricular septal defect and excised the pulmonary stenosis in this manner, using hypothermia.

DR. W. LILLEHEI described his method of cross-circulation to permit of open heart surgery. Considerable interest was manifest in this work of which he was the originator. He stated that as little donor blood as 25 millilitres per kilogram of recipient's body weight per minute seemed enough to make about 12 minutes available for intracardiac work. He described his flap method of closing ventricular septal defects. He had operated on patients with pulmonary hypertension, but found post-operative respiratory complications common and fall in the hypertension very slow. He denied that any donors had died, and stated that hypothermia should be reserved for operations on the right side of the heart only. DR. ROBERT GROSS reported his results in the closure of atrial septal defect in 33 patients, with a variety of techniques. He regards a high pulmonary resistance in this condition as a contraindication. DR. C. BAILEY had closed this defect in 58 such patients by an extracardiac technique with a mortality of 10%. All surgeons had had technical difficulty and a high mortality in attempts to close large defects low in the septum. DR. CHARLES HUFFNAGEL announced that he had inserted an artificial plastic valve in the descending aorta of 42 patients, 24 of whom are living and improved. DR. CHARLES BAILEY dealt with the relief of aortic stenosis and mitral incompetence. Most participants in the discussion, however, felt that no satisfactory operation yet exists for the relief of mitral incompetence. There were many accounts of results from mitral valvotomy, all showing considerable success, and little evidence of resealing of the valve.

Follow-up studies up to two years after operation rarely show a complete return of hæmodynamic findings to normal. In general the pulmonary artery pressure was halved by operation, and some cases of high pulmonary resistance showed a gradual fall at rest thereafter. The "Post Commissurotomy Syndrome" was considered to represent a recrudescence of the rheumatic infection or a resolving hæmothorax. The operation mortality in a number of series did not exceed 3%. Much discussion and ingenuity were concerned with various methods, including direct puncture from behind, of estimating left auricular pressures and their relative reliability. The influence on the prognosis of parenchymal changes in the lungs was emphasized.

The treatment of hypertension was warmly debated, and the general view appeared to favour combinations of drugs rather than dependence upon one vasodepressor agent. By polytherapy, the undesirable side effects of one constituent can be minimized.

The importance of the myocardial factor in constrictive pericarditis was stressed. Dramatic accounts of successful aortic grafting for thoracic and abdominal aneurysm were forthcoming from several American centres.

The consensus of opinion was that ballistocardiography and vectorcardiography are still not ready for adoption in clinical practice.

Representatives from the Mayo Clinic have found selective dye injections into various areas of the circulation of considerable value in locating the size, position and direction of intracardiac shunts. They also reported that continued improvement in the circulatory derangements of aortic coarctation follows the immediate benefit of successful surgery. Several American centres have replaced the whole aorta and iliac vessels below the renal arteries, and report success after tangential excision and lateral arteriorrhaphy of thoracic aneurysm. Two sessions were concerned with rheumatic fever, its relation to Aschoff bodies in auricular biopsies, and its management by steroids and salicylates. The treatment of acute rheumatism by the steroids received favourable mention from representatives of hospitals especially devoted to the care of this disease. Evidence was presented that steroid and ACTH concentrations are low in untreated rheumatic fever. One two-year follow-up claimed to show that hormone-treated patients developed less subsequent valve damage. Combined hormone and salicylate therapy was generally favoured, especially for "rebound" phenomena. The value of *C* reactive protein as an aid to assessment of activity received frequent mention. Cortisone can be relied upon to dispense rheumatic nodules. New drugs were scarce—the value of acetazoleamide ("Diamox") as a diuretic for oral use was agreed upon; some new anticoagulants were mentioned; "Nerufolin" and "Gitalin" are digitalis substitutes, but are unlikely to displace it. The value of long-term anticoagulant therapy was supported statistically from several centres. Radioactive iodine has replaced surgery where ablation of the thyroid gland is desired, for patients incapacitated by cardiac pain or congestive failure. Experimental atherosclerosis in many chemical and physical aspects, and the effects of heparin and sex hormones on the lipoproteins received considerable attention.

In these scientific sessions, virtually every type of heart disease came under consideration, while the full range of diagnostic methods and therapy was fully reviewed. Special sessions were devoted to occupational cardiology and rehabilitation. Four meetings were devoted entirely to electrocardiography. Very few papers were presented by single authors; usually three or more co-authors were concerned. It is impossible to do credit to the vast amount of preparation and scientific content of the more than three hundred papers presented, and to the tremendous problems of organization connected with the largest world congress which has ever been held, but every participant received a strong stimulus, and absorbed as many new facts as his endurance permitted.

Our American hosts fully justified their reputation for warm hospitality, and the wives of the members of Congress had an enjoyable and busy tour of beautiful Washington and its surroundings. For the members themselves, a visit to the National Gallery of Art by night, a banquet and a symphony concert were combined with several receptions, including one at the Australian Embassy for visitors from the British Commonwealth. On two afternoons, visitors were taken on "medical sightseeing tours" of the more important medical and research organizations in or around Washington, including the National Institute of Health and its Clinical Centre, the Walter Reed Hospital, the National Naval Medical Centre, the Armed Forces Institute of Pathology, the three University Medical Schools of Washington *et cetera*.

During the weeks following the Congress, a series of optional tours had been planned to important centres of cardio-vascular research and practice in other parts of the United States. The shortest of these, lasting ten days, included visits to Baltimore, Philadelphia, New York and Boston and was attended by the majority of visitors from Great Britain and the Commonwealth. At each city visitors were welcomed to scientific programmes arranged by local committees of the American Heart Association.

The Third International Congress of Cardiology will be held in Brussels in September, 1958.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

PUBLIC NOTICE.[1]

[From *The Australian*, August 20, 1840.]

DR. C. SMITH embraces the first moments of convalescence, from afflicting illness that suddenly brought him into the valley and shadow of death, of publicly acknowledging the mercy and goodness of a God hearing and answering prayer: and with humility trusts, that amidst evil and good report, his spared life may be devoted to the Lord and to the well being of mankind.

Dr. S. feels it his duty also to express his gratitude to those medical friends who so kindly came to his assistance in that awful night when he took, as he then believed, the last farewell of his dear family. But to Mr. Surgeon Bland, as the chief instrument in the hand of Providence, Dr. S. and his family know not how to express their gratitude. His consummate judgement in the treatment of the case: his unremitted attentions night and day to Dr. S. when lost to himself and all around him: and the deep feeling of compassion he evinced for the members of the family and his patient, place them under a debt of gratitude to that gentleman they will never be able to cancel. Dr. S. avails himself of this opportunity to express his grateful acknowledgements to his personal friends for their unchanging kindness and affection during the whole of his awful visitation: and begs to inform them, that whilst from extrinsic weakness and exhaustion, he is, for a season, unable to visit Sydney, yet he can receive his friends and patients at his house on the Surry Hills (near the Boundary Stone Public House) from Ten o'clock in the morning till Four in the afternoon: and it will afford him great pleasure to see those who will favour him with a call, especially as all hope on his part of ever again meeting them was so lately impressed on his mind.

Dr. S. begs also that the parents of those poor children who were under his charge, before his illness, will bring them to him should they be living and not cured. The poor he hopes will come to see him as when in Sydney as he will be really glad to serve them: and sincerely wishes that his means to supply their wants were equal to their necessities.

Alvanly Lodge,
Surry Hills,
17 August, 1840.

Correspondence.

CAECOSTOMY.

SIR: The recent article on "Caecostomy" by Mr. Hughes and the subsequent letter by Mr. Robert Lawson advocating colostomy prompt me to mention yet another method of treating large bowel obstructions which was advised by Mr. Rodney Maingot during his visit to Sydney in September. He stated that in recent years it has been his practice, in lesions of the distal colon, to fashion a colostomy about six

[1] From the original in the Mitchell Library, Sydney.

inches proximal to the growth and then resect both cancer and colostomy at the second operation. This method gives maximum decompression and spares the patient from a fairly formidable third operation (closure of colostomy), but may be open to criticism on the grounds that surgery in the vicinity of the growth may hasten the spread of malignant cells. However, six inches seems a reasonably safe distance, and the cautery can be used to make the actual opening in the bowel.

Such a technique was recently used in the case of a frail woman, aged eighty-seven, who was admitted to hospital on October 10, 1954, with typical signs of acute obstruction of the sigmoid colon. The diagnosis was confirmed at operation the same day, using a left paramedian incision, the colostomy being brought out through the same wound. Steady improvement in the patient's condition permitted the second operation on November 1. Using a left lower oblique incision, both carcinoma and colostomy were resected and bowel continuity restored by end-to-end anastomosis. It was found that so soon after the first operation the colostomy could very readily be dissected free, this procedure adding only a few minutes to the operating time. Both wounds healed well, and the patient was discharged on November 17.

As Mr. Lawson stated, many of these patients are elderly, and a method which offers a more rapid convalescence seems worth trying.

Yours, etc.,

143 Macquarie Street, Sydney,
December 16, 1954.

J. M. YEATES.

PRACTITIONERS AND MEDICAL BENEFITS.

SIR: I would like to applaud the sound economy expressed by "Medical Benefits Contributor", of Rockhampton, Queensland, in his so very practical little letter (published in THE MEDICAL JOURNAL OF AUSTRALIA, January 1, 1955) entitled "Practitioners and Medical Benefits".

Yes, it is good business for all medical practitioners to belong to one of the medical benefit societies, for three reasons. Firstly, we can all adopt that "practise what we preach" attitude toward the public. Secondly, busy specialists and senior medical practitioners will be fully rewarded (or almost fully) for their expert care of us and our families, but more particularly for the time spent in so doing. Finally, "that dreadful sense of obligation" will be alleviated in us, in like proportion to the amount of fee payable by the Federal Government *plus* the particular benefit society to which we contribute.

But, why should the nurses, who carry out duties as manual as any navvy and twice as menial (and I am not referring to those fortunate nurses wedded to husbands who also work, but the unmarried ones), and why should the members of the lowest paid profession be called to help bear the burden of those "staggering overhead costs" of specialist practice?

May the day never dawn when I must refer a patient to Mr. John L. Jones, M.D., M.S., L.S.D.

Yours, etc.,

Bulli, New South Wales,
January 1, 1955.

FRANCIS K. BARTLETT.

CONCERNING VARICOSE VEINS.

SIR: Since the publication of an article concerning treatment of leg ulcers in the *British Medical Journal* on October 30, 1954, at page 1040, I have felt that it should be mentioned that there has been developed a method of treatment quite different from the treatment by drugs therein described.

I believe my views to be unorthodox, but having treated this complaint by completely removing varicose veins in 500 cases by anatomical dissection or mechanical means with no subsequent sclerosing injections, I feel that this method merits attention. As a result of this treatment varicose ulcers have healed within a few weeks even though they have been present for ten years, swelling of the legs has disappeared or diminished, eczema has cleared up with no treatment, and bandages and elastic stockings have been thrown away permanently in 95% of patients. Patients are able to do house work in one week, return to light work in two weeks and heavy manual work in three weeks.

There are often large communicating veins between the long and short saphenous system and deep communicating veins which cannot be visualized before dissection of the veins which explains the failure of sclerosing solutions to cure many sufferers. The blood lost at dissection is less than four ounces in bad cases and equal to the volume and blood in the long saphenous vein when removed by a special technique imported from Glasgow which is applicable to 30% of patients. A three-inch cut in the groin and one-inch cut over the internal malleolus enables removal of the long saphenous vein in one piece with no further bleeding. Afterwards the patients are able to walk down 39 steps to a taxi which takes them home. They rest for three days and return on the third day to have their dressings changed, and again ten days later to have all their stitches removed, when all the cuts have healed.

The time spent at dissection of two legs diminished rapidly with experience and organization of the operating room, so that the operation is completed in two to four hours, during which time the patient sleeps peacefully while the operator and assistant are seated during the whole procedure.

In conclusion, I recommend this operation for the treatment of cases whether the patients be young or old, obese or thin, as it has had no mortality in this series. Pulmonary embolism has not occurred in the last 200 cases due to a different aftercare, and antibiotics are seldom used. The incisions give a good cosmetic result. I believe this to be a fresh line of treatment which offers advantages over the often long and tedious treatment required when drugs are used.

Yours, etc.,

229 Hunter Street, Newcastle, New South Wales.
December 20, 1954.

J. N. R. STEPHEN.

GARDENING AND CANCER.

SIR: It is my clinical impression that patients who are active gardeners have a much greater host resistance to internal carcinoma than do non-gardeners. Their survival period appears to be far greater in my experience. Whether this assumption is coincidental and false could be ascertained by practitioners working in city, suburban and country districts. May I, with respect, suggest this observation be made, and if established, submitted to the biochemists.

Yours, etc.,

135 Macquarie Street, Sydney,
December 20, 1954.

ERIC GOULSTON.

YOUNG DOCTORS AND SPECIALIZATION.

SIR: May I make the following brief reply to Dr. Ewen Sussman's remarks in THE MEDICAL JOURNAL OF AUSTRALIA, November 20, 1954.

The very thing which makes a sound doctor, namely, experience in the common everyday bread and butter illnesses of life, is lacking in the teaching hospital training of young doctors going straight into specialty study immediately or soon after graduation. Dr. Sussman agrees that "any specialist must have his medical experience broadly based before concentrating on any one branch of medicine", and then points out that the difficulties of getting hospital posts in Australia make an aspiring specialist go into a post in England "where specialists commence their training at graduation".

Where, oh, where in the path to fame and extra diplomas does this young specialist-to-be receive his experience broadly based? Not in a general roundabout of resident jobs in his first or second year after graduation surely. In most cases, I put forward, he misses any actual experience in the countless trivialities of everyday sickness, which nevertheless are so important and constitute the majority of our population's ills. He only gets this training from many years of studying people closely in a general medical practice.

All the difficulties of specialization which Dr. Sussman states have arisen lately are mainly due to the fact that the supply is exceeding the demand. They would be largely forgone if the doctor waited until he was more mature and more experienced in medical and non-medical matters and had acquired, through general practice of many years, a

secure financial state to enable him to do overseas study in comfort. His financial position would not be "drained", and on his return he would not be near penniless and have to "enter into stiff competition" for a suitable opening in his chosen field. He would have a secure financial position and would have the bearing and status of a true consultant, a man of mature and wise judgement, not a newly fledged technico armed with his new diploma and nil else.

I have been very alive to the change in specialization which has occurred in recent years, and I think that it is a change not to be welcomed or encouraged in any way. Look at the mess that exists in England today with their hospital system. I think the trend over there now is to look to a future where they can raise the status of general practice again and put the brakes on the trend to over and early specialization.

Yours, etc.,

O. H. GREEN.

Ballina,
New South Wales,
December 14, 1954.

Post-Graduate Work.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

Programme for February, 1955.

Gynæcology and Obstetrics Refresher Course.

A GYNÆCOLOGY AND OBSTETRICS REFRESHER COURSE for recent graduates will be conducted at the Royal Women's Hospital, Carlton, from February 7 to 18. This course is intended to fulfil the requirements of resident medical officers about to enter private practice, and a detailed programme of the lecture-demonstrations is available from the Post-Graduate Committee. The tuition fee of £10 10s. is payable to the committee. Residence will be available at the University Hotel, Carlton, and early reservation is advised. Lunch and dinner will be served at the hospital.

Pædiatrics Refresher Course.

A pædiatrics refresher course for recent graduates will be conducted at the Royal Children's Hospital from February 21 to 26. At all times the emphasis will be on clinical work rather than straight lectures. Quiz sessions will give post-graduates an opportunity to raise any subjects on which they would like discussion. A detailed programme is available from the Post-Graduate Committee. The tuition fee is £5 5s., and enrolments should be made by February 7.

Country Courses.

On February 18 at 8 p.m., at Bendigo, Dr. H. Mortensen will lecture on "Bladder Neck Obstruction in Adults and Children".

On February 24 at 8 p.m., at Ballarat, Dr. A. E. Coates will lecture on "Operations in the Autonomic Nervous System: Their Indications and Results".

Courses for Higher Qualifications.

Classes for candidates for Part I of higher qualifications will commence at the University of Melbourne on February 28 and continue till July. They will be as follows:

Classes in anatomy for the M.S., D.G.O., D.O., D.L.O., D.P.M., D.D.R., D.T.R., D.A., Primary F.R.A.C.S. and Part I of D.C.R.A. will be held at 2.15 p.m. on Mondays and Wednesdays, commencing on February 28.

Classes in physiology for the M.D., M.S., D.G.O., D.O., D.L.O., D.P.M., D.D.R., D.A. and Primary F.R.A.C.S. will be held at 3.45 p.m. on Mondays and Wednesdays, commencing on February 8.

Classes in pathology for the M.D. and as a basic course for Part II of the M.S. and the diplomas and for M.C.R.A. will be held at 1.45 p.m. on Mondays and Wednesdays, commencing on February 28.

Classes in physics for the D.D.R., D.T.R. and D.C.R.A. will be held at 4 p.m. on Thursdays, from March 3 till June.

Enrolments should be made by February 15. The fee is £15 15s. per subject, except in the case of the D.O., when it is £17 17s. for physiology and £17 17s. for anatomy. The fee for Part I D.D.R. is £31 10s.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 25, 1954.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	2(2)	2(1)	..	..	..	..	..	4
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	1	..	2	..	..	..	3
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	1(1)	..	..	..	..	..	..	1
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	4(1)	9(8)	10(9)	..	..	..	..	..	23
Diphtheria	2(1)	1	1(1)	..	2(2)	..	..	..	6
Dysentery (Bacillary)	..	..	2(2)	..	..	..	..	..	2
Encephalitis	..	2(2)	..	..	..	..	..	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	64(23)	21(12)	..	4(4)	2	..	..	..	91
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	1	..	..	..	1
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	1(1)	..	..	..	..	..	1
Meningococcal Infection	2	3(2)	..	..	1(1)	..	..	..	6
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	3(2)	9(6)	11(3)	1(1)	..	1(1)	..	..	25
Puerperal Fever	2(1)	..	..	..	..	..	..	..	2
Rubella	..	20(17)	..	..	7(7)	..	..	..	27
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	8(6)	16(9)	5(3)	9(8)	..	1	..	..	39
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	..	..
Trachoma	..	..	..	..	10(3)	..	..	..	10
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	34(29)	17(14)	25(12)	3(2)	8(5)	5(4)	..	..	92
Typhoid Fever	..	..	..	..	1	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	1	..	..	..	1
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Courses in March.

Attention is drawn to the following courses.

A course in surgery, suitable for candidates for senior surgical qualifications, will be conducted by the honorary surgical staff of the Royal Melbourne Hospital from March 21 till April 29. Classes in clinical surgery will be held on Monday, Tuesday, Thursday and Friday afternoons at 4 p.m. The fee for the course will be £5 5s.

Dr. Peter Kerley, C.V.O., C.B.E., M.D., F.R.C.P., F.F.R., of London, will visit Melbourne from March 1 to 4 and will lecture on Tuesday and Thursday evenings on "Pulmonary Fibrosis" and "Lung Changes in Congenital and Acquired Heart Disease".

Dr. Richard Kern, M.D., Professor of Medicine, Temple University, Philadelphia, may also be in Melbourne about March 24 or 25, when it is hoped that he will lecture on "Our Growing Responsibilities to the Aged in Our Midst".

Examinations in the United Kingdom.

The Post-Graduate Committee has received a list of dates of examinations to be held in Great Britain in 1955 and in 1956, where known.

Enrolment for Courses.

All entries for courses mentioned above should be made with the Melbourne Medical Post-Graduate Committee, 394 Albert Street, East Melbourne (FB 2547), not later than two weeks before the commencement of the course, or by the date specified.

Course in Psychiatry.

The Victorian Mental Hygiene Authority will provide a course in psychiatry, commencing on February 28, 1955, and continuing for about five months. This will consist of two sessions per week from 4 p.m. to 6 p.m., which will be held mainly at the Royal Park Receiving House. Inquiries should be addressed to the office of the Mental Hygiene Authority, 300 Queen Street, Melbourne.

THE COLLEGE OF RADIOLOGISTS OF AUSTRALASIA.

The Thomas Baker Memorial Fellowship.

THE Council of the College of Radiologists of Australasia have announced that Dr. Mancell Gwenneth Pinner, of Melbourne, has been elected to the Thomas Baker Memorial Fellowship for 1955. This Fellowship was established by the trustees of the Thomas Baker (Kodak), Alice Baker and Eleanor Shaw Benefactions, who have made available the sum of £1500 for the purpose of sending abroad a young Australian radiologist for post-graduate experience.

Research.

ROYAL SOCIETY OF MEDICINE.

William Gibson Research Scholarship for Medical Women.

THE William Gibson Research Scholarship for Medical Women, the value of which is £200 *per annum* for two years, will be awarded in July, 1955, to date from October, 1955, to a qualified medical woman (British subject) selected by the Scholarship Committee. Applications should include schedule of proposed research, two testimonials and a statement of professional training and appointments, and should reach the Secretary, Royal Society of Medicine, 1 Wimpole Street, London, W.1, England, by June 1, 1955.

Deaths.

THE following death has been announced:

WOLFERS.—Philip Benjamin Wolfers, on January 5, 1955, at Moorabin, Victoria.

Medical Appointments.

Under the provisions of the *Quarantine Act*, 1908-1950, Dr. Clifford Markland, Dr. John Grattan Gunson and Dr. Colin Campbell Reid have been appointed as Quarantine Officers at Fremantle (Western Australia), Georgetown (Tasmania) and Cairns (Queensland) respectively.

Dr. J. L. Bignell and Dr. J. McB. White have been appointed members of the Opticians Registration Board of Victoria, being nominees of the Victorian Branch of the British Medical Association.

Dr. M. E. Chinner and Dr. C. B. Sangster have been appointed honorary physicians to the Royal Adelaide Hospital.

Dr. W. M. Irwin and Dr. R. A. A. Pellew have been appointed honorary assistant physicians to the Royal Adelaide Hospital.

Diary for the Month.

JAN. 26.—Victorian Branch, B.M.A.: Branch Council.
JAN. 28.—Queensland Branch, B.M.A.: Council Meeting.
FEB. 1.—New South Wales Branch, B.M.A.: Organization and Science Committee.
FEB. 2.—Western Australian Branch, B.M.A.: Branch Council Meeting.
FEB. 4.—Queensland Branch, B.M.A.: Clinical Meeting.
FEB. 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Tasmania: Part-time specialist appointments for the north-west coast of Tasmania.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.